

**Michael Gessler, Karen Evans,
Johanna Lasonen, Margaret Malloch and Martin Mulder**
Editors



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Effects of Augmented Reality on Student Achievement and Self-Efficacy in Vocational Education and Training

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Abstract: This study aimed to test the impact of augmented reality (AR) use on student achievement and self-efficacy in vocational education and training. For this purpose, a marker-based AR application, called HardwareAR, was developed. HardwareAR provides information about characteristics of hardware components, ports and assembly.

The research design was quasi experimental with pre-test post-test that included a control group. The study was conducted with 46 undergraduate students in the Computer Hardware Course. Computer hardware course achievement test, motherboard assembly self-efficacy questionnaire and unstructured observation form were used in the study for data collection purposes. The control group learned the theoretical and applied information about motherboard assembly by using their textbooks (print material) while students in the experimental group used HardwareAR application for the same purpose.

It was found that the use of AR had a positive impact on student achievement in motherboard assembly whereas it had no impact on students self-efficacy related to theoretical knowledge and assembly skills. On the other hand, use of AR helped learners to complete the assembly process in a shorter time with less support.

It is concluded that compared to control group students, experimental group students were more successful in computer hardware courses. This result shows that AR application can be effective in increasing achievement. It was concluded that AR application had no effect on students motherboard assembly theoretical knowledge self-efficacy and motherboard assembly skills self-efficacy. This result may have been affected from the fact that students had high levels of theoretical knowledge and assembly skills before the implementation. Observations showed that AR application enabled students to assemble motherboard in a shorter time with less support. It is thought that simultaneous

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interaction between virtual objects and real world provided by the AR application is effective in reducing assembly time. The students who were able to see the process steps and instructions directly with the help of HardwareAR application could complete the assembly by getting less help. Considering these results, it can be argued that, thanks to simultaneous interaction it provides, AR offers an important alternative for topics that need learner application and practice.

Keywords: VET, Vocational Education and Training, Vocational School, Computer Assisted Instruction, Augmented Reality, Motherboard Assembly

1 Introduction

AR is described as a technology that integrates real images with virtual objects simultaneously (Azuma, 1997; Caudell & Mizell, 1992). In more extensive definitions, AR is defined as enhanced visualization of real images by adding virtual objects such as texts, photos, audio, animations, videos and 3-dimensional models (Delello, 2014; Perez-Lopez & Contero, 2013; Pylväs & Nokelainen, 2017). In this sense, AR provides a real and live environment. With the enhancement it offers, AR ensures that users reach more information than their sensory organs allow (Sirakaya, 2016).

Although AR has been used in other fields for a long time, it is observed that studies on the utility and potential of AR in educational environments have been recently launched (Wu et al., 2013). In addition to ease of its use; the pedagogical advantages AR offers has drawn attention to its use in education in a short time. Previous studies list the benefits provided by AR use in educational environments. It is known that while use of AR draws student interest and attention on lessons, it also increases their motivation (Delello, 2014; Perez-Lopez & Contero, 2013; Tomi & Rambli, 2013). Besides; environments that cannot be generated in real world conditions because of various impracticalities (Shelton & Hedley, 2002; Yuen et al., 2011) can be safely created and dangerous experiments (Wojciechowski & Cellary, 2013) can be safely conducted in teaching with the use of AR. Besides these features, AR has advantages such as providing student centred learning (Delello, 2014) and learning by doing (Singhal et al., 2012; Wojciechowski & Cellary, 2013). These advantages give insights about its use in applied education. In particular, the ability to provide presentation of virtual objects such as 3D models and abstract concepts by combining them with real world images makes AR an important tool for teaching assembly and maintenance tasks which requires treatment of objects (Westerfield et al., 2015).

1.1 Augmented Reality in Vocational Education and Training

Application skills such as assembly and maintenance are difficult to learn without individualized teaching or the supervision of the experts (Sirakaya, 2016). Assembly manuals are generally used to facilitate the assembly process (Hou et al., 2013). However, these manuals often contain very extensive and unnecessary information about assembly. The

misunderstandings caused by this situation decrease the motivation of the assembler (Wang & Dunston, 2008) and result in work that takes longer (Zaeh & Wiesbeck, 2008). Generally, instructions, schemas, diagrams and videos used for this purpose are not useful for learners because they are often hard to understand and time consuming to interpret. On the other hand, users continuously have to alternate between content and the assembly while using these tools (Westerfield et al., 2015). In addition to increasing the number of errors in the assembly and assembly process, this situation also causes users to experience physical strain. AR can be used in solving of these problems with the simultaneous interaction it provides between virtual objects and the real world (Hou et al., 2013; Ke et al., 2005; Rios et al., 2013; Webel et al., 2013). Instead of following the instructions and steps they will use in the assembly from another learning material, users can see them simultaneously on the real image with the help of AR (Hou et al., 2013; Wang & Dunston, 2006; Webel et al., 2013). Thus, users can better focus on the assembly they work on without having to turn their heads or bodies to another direction (Baird, 1999; Baird & Barfield, 1999). Therefore, more intuitive, interactive and effective experiences can be provided and new opportunities can be discovered for rapid skill development (Westerfield et al., 2015). These advantages make AR a preferred technology in the fields of maintenance and assembly. There is a multitude of studies that use AR technology in the field of maintenance and assembly. Some of these studies are listed in Table 1.

Table 1 shows that use of AR in maintenance and assembly provides advantages in terms of time, number of errors and costs. Considering the contributions of AR in assembly, it could be claimed that one of the fields in which the features of AR can be effectively used is motherboard assembly. It was identified via literature review that few AR studies were conducted on motherboard assembly. In one of these studies, Alfianita (2014) developed an AR application that involved information about fundamental hardware units in the computer tower (motherboard, processor, processor fan, RAM, hard disc and power supply) and their assembly. When the application senses pre-defined markers, it presents the user with 3 dimensional videos that displays information about the hardware and how to assemble it. As a result of tests conducted on the application, Alfianita (2014) stated that the AR application is a tool that can be used in teaching hardware units.

In their studies, Baird (1999) and Baird and Barfield (1999) compared traditional teaching materials (assembly manual vs. computer assisted material) and AR imaging systems (opaque vs. see-through) in motherboard assembly. In addition to comparing wearable AR systems and traditional teaching methods, the study also focused on testing AR imaging systems with one another. Also, surveys were given to participants in each group to collect data about the usability of materials. At the end of the study, it was identified that both AR imaging systems were more effective in teaching motherboard assembly compared to the other two materials. It was also observed that students who used AR completed motherboard assembly in a shorter time period and with lesser number of errors. However, it was identified that both of these AR systems were not as adequate as traditional materials in terms of usability.

Table 1: AR Studies on Maintenance or Assembly

Researcher(s)	Assembly/ Maintenance	Results
Caudell and Mizell (1992)	Assembly	Developed AR application for aircraft maintenance
Reiners, Stricker, Klinker, and Müller (1999)	Assembly	Developed AR application to be used in assembly of vehicle door lock systems
Sääski et al. (2008)	Assembly	Developed AR application to be used in assembly of tractor power units
Henderson and Feiner (2009)	Maintenance	The AR application developed to support personnel in the maintenance of armored military vehicles provided 46% more speed in maintenance time compared to the use of computer screen
Rios et al. (2013)	Maintenance	The AR application developed to support personnel in the maintenance of aircraft motors provided approximately 17% time saving as well as 24% increase in quality.
Ramírez, Mendoza, and González (2015)	Assembly	According to manual instructions, during statistical process control, AR use allowed the process to be 30% faster and with reduced costs.
Tang, Owen, Biocca, and Mou (2003)	Assembly	Use of AR in teaching assembly skills provided 82% less errors
Raghavan, Molineros, and Sharma (1999)	Assembly	Developed AR application to support planning engineers
Boud, Haniff, Baber, and Steiner (1999)	Assembly	Compared manual instructions, virtual reality and AR. The group that used AR completed the assembly the fastest.
Zauner, Haller, Brandl, and Hartmann (2003)	Assembly	Developed AR application to display the parts that will be used in furniture assembly in turn.

Wiedenmaier, Oehme, Schmidt, and Luczak (2003)	Assembly	Compared manual instructions and AR in assembling car doors. While AR saved time in difficult assembly levels, there were no differences in easy levels.
Pang, Nee, Khim Ong, Yuan, and Youcef-Toumi (2006)	Assembly	Developed AR application that displays the parts to be used in assembly respectively
Hou et al. (2013)	Assembly	AR application in LEGO robot assembly decreased assembly time and number of errors compared to manual instructions. There were no differences in terms of cognitive load.
Bacca, Baldiris, Fabregat, Kinshuk, and Graf (2015)	Maintenance	AR application was used in vocational education to teach students how to paint cars. Results of the study showed that AR use increased attention, precision, trust and satisfaction.

In a similar study, Westerfield et al. (2015) designed a smart AR system by combining AR technology and smart systems. By using AR graphics with adaptable guides, they prepared a smart AR system that displayed motherboard assembly for novice users followed by a study that compared the normal AR system with the smart AR system. According to study results, students who used the smart AR system completed motherboard assembly faster and with fewer mistakes.

Ke et al. (2005) developed a prototype AR system to be used in training students on computer hardware part repair and maintenance. As a result of their research, they stated that the prototype AR application developed for this purpose provided satisfactory results and that AR technology was an effective tool that could be used for this goal.

In their study, Seok and Kim (2008) compared print, web based and AR based assembly guides. Study results show that participants who used the AR based guide completed the motherboard assembly 60% faster than the other participants.

In his study, Sirakaya (2016) compared the assembly manual and AR application in teaching motherboard assembly. According to study results, students who learned with the help of AR application completed the motherboard assembly at 20% shorter time and with 50% less errors.

1.2 Significance of the Study and Hypotheses

It is thought that Computer Hardware course, which aims to provide students with information about the qualities of computer hardware units and ensure proper assembly of these units, is suitable for the use of AR technology. Computer Hardware is a

course that aims to help students gain both theoretical knowledge and applied skills. In achieving the goals of the course, it is important for students to work comfortably and in a self-confident way in the assembly process. In this context, it can be argued that students' self efficacy regarding motherboard assembly can play an important role to achieve the targets of the lesson. Bandura (1986) defined self efficacy as the beliefs and ad judgment of individuals to achieve a specific task and emphasized that self efficacy is a significant factor that affects individuals' behaviors. When the concept of self efficacy is considered in terms of assembly, it can be defined as students' self judgments about the information and skills they should possess to complete the motherboard assembly. It means, students' theoretical and application skills self efficacy may play a role in accurate completion of motherboard assembly. This study attempts to identify whether the use of AR in vocational and technical education will change student self efficacy in regards to motherboard assembly.

There are many studies in literature identifying that use of AR in classes increased academic achievement (Shelton and Hedley, 2002; Sin and Zaman, 2010; Yen, Tsai and Wu, 2013; Zhang et al., 2014).while similar studies were conducted with students at different educational levels (primary, secondary and higher education), no studies were found that explored the impact of AR use in vocational and technical education on academic achievement. Students have difficulties while performing motherboard assembly due to the complex structure of hardware units and concerns related to damaging them during the process (Webel et al., 2013). Also, differences between the hardware units included in the course books and the ones used in practice make students experience confusion. The published materials that are expected to guide students during assembly of the parts are insufficient due to aforementioned reasons and negatively affect learners' development. When these are taken into consideration, it is believed that use of AR in motherboard assembly will positively contribute to students' academic achievements.

These types of studies are needed to identify the ideal use of the AR technology in educational environments. It is noteworthy that studies on the use of AR in vocational education and training are insufficient while studies were conducted in various educational fields in the literature (Bacca et al., 2014; Bacca et al., 2015). While there are some studies to develop AR applications for operators and technicians (Ramírez et al. 2015; Rios et al. 2013; Caudell and Mizell 1992; Reiners et al. 1999; Sääski et al. 2008; Henderson and Feiner 2009; Tang et al. 2003), the number of studies conducted for this purpose in educational environments is rather few. On the other hand, it was identified that studies conducted in this field used print materials as markers of the AR applications (Alfianita, 2014; Baird & Barfield, 1999; Baird, 1999; Ke et al., 2005; Seok & Kim, 2008; Sirakaya, 2016; Westerfield et al., 2015). It is believed that using the hardware units themselves (natural markers) in the process of motherboard assembly as markers is the added value of this study. It is believed that conducting the study in vocational education and training (motherboard assembly), utilizing an AR application that worked with real hardware parts and including students from a two-year program in the study will provide significant contributions to studies in this field. In this context, it was aimed to test the hypotheses provided below:

H1₀ = In Computer Hardware classes, there are no significant differences between academic achievements of students who learn motherboard assembly through print materials and students who learn motherboard assembly via AR applications.

H1₁ = Computer Hardware class academic achievements of students who learn motherboard assembly via AR application are significantly higher than Computer Hardware class academic achievements of students who learn motherboard assembly through print materials.

H2₀ = There are no significant differences between students who learn motherboard assembly through print materials and students who learn motherboard assembly via AR applications in terms of motherboard assembly theoretical knowledge self-efficacy.

H2₁ = Motherboard assembly theoretical knowledge self-efficacy of students who learn motherboard assembly via AR applications is significantly higher than that of students who learn motherboard assembly through print materials.

H3₀ = There are no significant differences between students who learn motherboard assembly through print materials and students who learn motherboard assembly via AR applications in terms of motherboard assembly application skills self-efficacy.

H3₁ = Motherboard assembly application skills self-efficacy of students who learn motherboard assembly via AR applications is significantly higher than that of students who learn motherboard assembly through print materials.

2 Method

A quasi experimental, random matched design with pre-test post-test and control group was used in the study. This design is used in order to increase the possibility of having equal groups in terms of the studied variables (Büyüköztürk et al., 2008). For this reason, sample pairs generated according to pre-test results were randomly assigned to experimental and control groups.

2.1 Working Group

The study consisted of 46 (all) students (18 female, 28 male) attending their 1st year in Computer Programming at Ahi Evran University, Mucur Vocational School of Higher Education. Each pair of students were matched according to their equivalency in academic achievement and self-efficacy results obtained in the pre-test and 23 subject pairs were obtained in this manner. Instructor views were sought about these subject pairs. 6 subject pairs were changed based on the views of the instructors in the department and it was ensured that all subject pairs were then equivalent in terms of variables such as

achievement in general, prior knowledge, socioeconomic status, gender, experience and technical knowledge. Later, the students included in the subject pairs were randomly assigned to experimental and control groups to form the 23-student experimental and 23-student control groups.

2.2 Learning Materials (HardwareAR)

A marker-based augmented reality application called HardwareAR was developed for the implementation process. In this application, it was decided to use hardware pieces as natural markers instead of print materials in order to ensure that learners directly interact with the hardware units. For this purpose, photos of the hardware units to be used in HardwareAR were taken in a studio. Then, in order for these photos to be sensed as markers by HardwareAR, the photos were adjusted as needed with the help of Photoshop CS5 program. Thus, it was ensured that motherboard, processor, hard disc and RAM were used as markers. Unity3D game motor was used in the development of the HardwareAR application. Project file was improved by integrating the required Software Development Kits and the photographs determined as markers into Unity3D environment. AR application was developed in this environment and converted into setup file (.apk) format. The setup file was distributed to the students in experimental group before implementation and it was ensured that they installed the file in their mobile devices (smart phones). Since hardware units introduced as markers were needed to run the HardwareAR application, distributing the application did not cause any problems in terms of the validity of the study. HardwareAR application concurrently adds on the real image of the hardware part virtual data including its features, connection ports and assembly. Therefore, it was ensured that students obtained the information they needed through hardware units they were assembling rather than through another means. HardwareAR application includes theoretical and applied information that the students need about motherboard assembly. Screenshots of HardwareAR are presented in Figure 1.

2.3 Implementation Process

During the research process, students were both provided with theoretical information and they were given opportunities to assemble motherboards. The students included in experimental and control groups went through the same stages in the process, only the teaching material was different for each group. First of all, theoretical and applied information was provided by the instructor (2 weeks - 4 lesson hours) in the courses where motherboard assembly was going to be implemented. The related hardware units were distributed to learners in the next 2 weeks (4 lesson hours) in order for them to apply the previously provided knowledge. In this phase, the students were expected to place the processor, hard disc, RAM and the display card on the accurate parts of the motherboard.

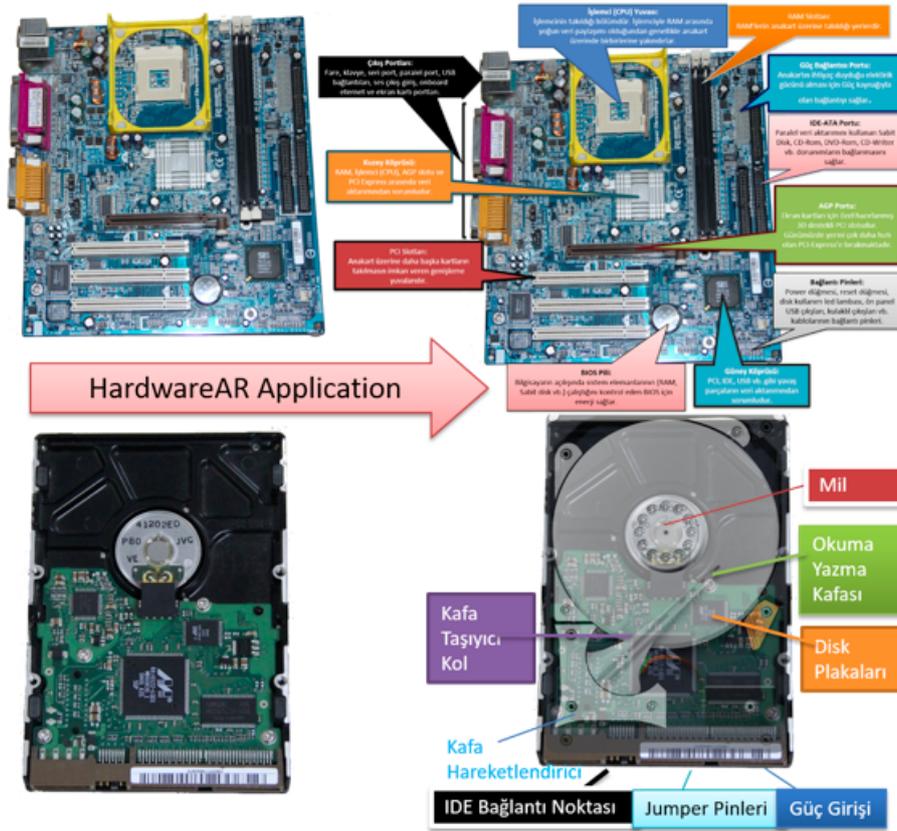


Figure 1: Screenshots of HardwareAR Application

The experimental operation was utilized in those 4 weeks and students in the experimental and control groups were taught by using different materials. The control group learned the theoretical and applied information about motherboard assembly by using their textbooks (print material) while students in the experimental group used HardwareAR application for the same purpose. Students in both groups worked individually during this process and only oral support was provided to students by the instructor. The implementation was completed in 6 weeks (12 lesson hours) with 2 weeks for implementation of the pre and post tests and 4 weeks for teaching motherboard components and its assembly in an applied manner.

2.4 Data Collection Tools

Computer hardware course achievement test, motherboard assembly self-efficacy questionnaire and unstructured observation form were used in the study for data collection purposes. Computer hardware course achievement test: The test aimed to identify students' knowledge levels on the functions and characteristics of the parts included in the

computer tower. The achievement test developed by the researchers consisted of 20 multiple choice items. Each item in the test is scored 5 points and the lowest score that can be obtained from the test is 0 while and the highest score is 100. The test was analyzed by 2 field experts to ensure content and face validity. After the necessary adjustments were made after the expert review, pilot implementation was conducted on 48 learners who previously studied the computer hardware course. Kuder-Richardson-20 (KR-20) reliability co-efficient was calculated as 0.75 after the piloting. It can be claimed that the test has good reliability based on this value (Büyüköztürk, 2007). The achievement test was conducted twice on students; before and after motherboard assembly courses.

Motherboard assembly self-efficacy questionnaire: Since no measurement tools existed to identify students' motherboard assembly theoretical knowledge self-efficacy and motherboard assembly skill self-efficacy, a questionnaire was developed by the researchers. The 5-point Likert questionnaire consisted of 27 items in total - 16 items to identify theoretical knowledge self-efficacy and 11 items to identify assembly skills self-efficacy. These items aim to measure students' self-efficacy related to motherboard, processor, hard disc and RAM topics, included among the basic hardware units of the computer. The questionnaire items included statements on theoretical knowledge and assembly skills such as basic features, functions, types, ports and assembly of the hardware units. According to the responses given to the questionnaire, a student can obtain minimum 16 and maximum 80 in theoretical knowledge self-efficacy; minimum 11 and maximum 55 in assembly skills self-efficacy; and minimum 27 and maximum 135 in total. The questionnaire was finalized after 2 field experts analyzed it and some adjustments were made based on expert review.

Unstructured Observation Form: By observing the experimental and control groups during motherboard assembly, the researchers made notes with the help of unstructured observation form. Unstructured observation form enables the observer to be freer during data gathering (Büyüköztürk et al., 2008). Both researchers in the study observed students' motherboard assembly process and made notes without any interventions in their role as observers-as-participant.

2.5 Data Analysis

Since the sample size is less than 50, Shapiro-Wilks test was used to see whether the tests had a normal distribution (Büyüköztürk, 2007). Also, graphic analysis was done by drawing normal distribution curve. Although the tests showed normal distribution based on analysis results, it was decided to use non-parametric tests since the number of members in experimental and control groups was less than 30 (Roscoe, 1975; cited by Büyüköztürk et.al, 2008). Therefore, Mann Whitney U-test was utilized to identify whether experimental and control groups had significant differences in achievement and self-efficacy.

3 Findings

3.1 Findings about Group Equivalence before Implementation

Mann Whitney U-Test was conducted to determine whether the learners who were placed in experimental or control groups significantly differed in terms of study variables. Data related to test results are provided in Table 2.

Table 2: U-Test Results for Groups before Implementation: Achievement, Theoretical. TK=Theoretical Knowledge, AS=Assembly Skills

Variable	Group	n	X	Sd	Mean Rank	Rank Sum	U Value	z	p
Achievement	Exp.	23	58,3	3,12	24,09	554	251	-0,3	0,77
	Contr.	23	57,4	3,48	22,91	527			
TK self-efficacy	Exp.	23	55,6	2,36	24,67	567,5	237,5	-0,6	0,55
	Contr.	23	52,4	1,7	22,33	513			
AS self-efficacy	Exp.	23	42	1,54	26,11	600,5	204,5	-1,3	0,19
	Contr.	23	39,1	1,42	20,89	480,5			

Table 2 shows is no significant differences between experimental and control group students' achievement (U=251, p>.05), theoretical knowledge self-efficacy (U=237.50, p>.05) and computer hardware assembly skills self-efficacy (U=204.50, p>.05) before implementation. This finding shows that experiment and control groups were equal before implementation in terms of research variables.

3.2 The Influence of AR Application on Achievement

Mann Whitney U-Test was conducted to determine whether learners' achievement levels significantly differed according to posttest results. Data related to the results are provided in Table 3.

Table 3: U-test Results for Achievement Based on Group

Group	n	\bar{X}	Sd	Mean Rank	Rank Sum	U Value	z	p
Experimental	23	67,61	2,77	27,87	641	164	-2,221	,026
Control	23	57,39	3,29	19,13	440			

Table 3 points to a significant difference in achievement between the experimental group which took the courses with AR application and the control group which used the assembly manual ($U=164$, $p<.05$). When mean ranks are taken into consideration, it is observed that the students who took courses with AR application were more successful than the students that used the assembly manual. This finding can be interpreted that AR application has a positive contribution in increasing student achievement.

3.3 Influence of AR Application on Theoretical Knowledge Self-Efficacy

Mann Whitney U-Test was conducted to determine whether learners' theoretical knowledge self-efficacy levels significantly differed according to posttest results. Data related to the results are provided in Table 4.

Table 4: U-test Results for Achievement Based on Group

Group	n	\bar{X}	Sd	Mean Rank	Rank Sum	U Value	z	p
Experimental	23	61,78	1,92	25,67	590,50	214,50	-1,100	,272
Control	23	59,22	1,97	21,33	490,50			

First of all, Table 4 shows that students in the experimental and control groups had a high level of theoretical knowledge self-efficacy. Also no significant differences were observed between experimental group students who took the courses with AR application and the control group students who used the assembly manual ($U=214.50$, $p>.05$). The finding can be interpreted that AR application had no effect on students' theoretical knowledge self-efficacy.

3.4 Influence of AR Application on Assembly Skills Self-Efficacy

Mann Whitney U-Test was conducted to determine whether learners' assembly skills self-efficacy levels significantly differed according to posttest results. Data related to the results are provided in Table 5.

Table 5: U-test Results for Achievement Based on Group

Group	n	\bar{X}	Sd	Mean Rank	Rank Sum	U Value	z	p
Experimental	23	45,65	1,14	24,50	563,50	241,50	-.507	.612
Control	23	44,61	1,51	22,50	517,50			

First of all, Table 5 shows that students in the experimental and control groups had a high level of assembly skills self-efficacy. Also no significant differences were observed between experimental group students who took the courses with AR application and the control group students who used the assembly manual ($U=241.50$, $p>.05$). The finding can be interpreted that AR application had no effect on students' assembly skills self-efficacy.

3.5 Findings Related to Researchers' Field Notes

Based on researchers' observations, it was identified that experimental group students who took the courses with AR application completed the motherboard assembly in a shorter time. This finding was based on the notes taken by the researchers that while motherboard assembly was completed by the experimental group in class periods, control group had to be given extra time to complete their task. It was also observed that students in the experimental group asked for help from their friends or their instructor much less compared to students in the control group.

4 Results and Discussion

Based on the analyses conducted in the frame word of this study, it is concluded that compared to control group students, experimental group students were more successful in computer hardware courses. This result shows that AR application can be effective in increasing achievement. It has also been concluded in many studies that AR use in educational environments increases learner achievement (Shelton & Hedley, 2002; Sin & Zaman, 2010; Yen et al., 2013; Zhang et al., 2014). When contributions provided by AR technology in educational environments are taken into consideration, it can be argued that this result is expected. It is known that AR technology draws student interest and attention into courses and increases student motivation (Delello, 2014; Perez-Lopez & Contero, 2013; Tomi & Rambli, 2013). With these aspects, AR may have contributed to student achievement in the experimental group. Another finding of this study shows that AR application had no effect on students' motherboard assembly theoretical knowledge self-efficacy. Based on the analyses, it was identified that although theoretical knowledge self-efficacy of experimental group students increased, the increase was not significant. This result is parallel to the results obtained in other studies which state that the use of augmented reality does not change the students' computer self-efficacy or their attitudes towards computers (İbili & Şahin, 2015b; İbili & Şahin, 2015a). This result may have been affected from the fact that students had higher levels of theoretical knowledge self-efficacy before the implementation. Mentioning a similar finding, Hou et al. (2013) stated that AR use proves to be more effective especially in novice assemblers. Since self-efficacy is a concept which develops in time and with experiences (İbili & Şahin, 2015a), this result may be regarded to be based on the insufficiency of a 6-week implementation process in the formation of a significant difference. It was concluded that AR application had no effect on learners' motherboard assembly skills self-efficacy. This result may have been affected from the fact that students had higher levels of assembly

skills before the implementation. The department students attended may have affected this outcome. This finding contradicts the findings of various studies which stated that AR technology helps learners to assemble main boards faster and with fewer mistakes (Baird, 1999; Baird & Barfield, 1999; Seok & Kim, 2008; Sirakaya, 2016; Westerfield et al., 2015). Similarly, Bacca et al., (2015) reported that AR use has positive effects on students' application skills. Observations showed that AR application enabled students to assemble motherboard in a shorter time. This result is supported by other studies in the literature (Baird, 1999; Baird & Barfield, 1999; Seok & Kim, 2008; Sirakaya, 2016; Westerfield et al., 2015). Similarly, it was concluded in studies undertaken in other fields that AR use increased operators' and workers' maintenance and assembly speed (Boud et al., 1999; Henderson & Feiner, 2009; Hou et al., 2013; Ramírez et al., 2015; Rios et al., 2013; Tang et al., 2003). It is thought that simultaneous interaction between virtual objects and real world provided by the AR application is effective in reducing assembly time. Thus, students in this study were able to see the assembly steps directly on the hardware parts themselves rather than studying them on another teaching material. Another finding points to the fact that the students using AR application asked for less help from their instructors or friends. The students who were able to see the process steps and instructions directly with the help of HardwareAR application could complete the assembly by getting less help. Considering these results, it can be argued that, thanks to simultaneous interaction it provides, AR offers an important alternative for topics that need learner application and practice. AR technology which is used by technicians in different sectors such as repair, maintenance and assembly is an effective tool that can be used in educational environments for applied subjects.

5 Conclusion and Suggestions

This study presented the effects of AR use in vocational education and training on student achievement and self-efficacy. The results show that while AR use increases student achievement, it has no effect on theoretical knowledge self-efficacy and assembly skills self-efficacy. It was also understood that AR use decreases the duration for motherboard assembly and it enables students to work with less help. As a result, it can be stated that the applications developed with AR technology can be used as effective tools in applied courses. Considering the results obtained in this study, following suggestions are offered to guide researchers and application developers in future AR studies:

- It was concluded in the study that AR use increased student achievement. Based on this point, new studies can be planned in different fields and by using different sample levels.
- Student' smart phones were used in this study. Although no problems were experienced in the use of these devices, due to their nature, they have limitations based on small screen sizes. Therefore, more appropriate devices for applications such as AR goggles can be used in future studies by receiving necessary support from related institutions.

- The study carried out in the computer hardware course can be replicated in different courses in which students engage in applied work.
- The study was carried out with Vocational School of Higher Education students. Similar studies can be carried out with different sample groups in educational institutions such as Vocational High Schools etc. in which applied teaching is extensively used.

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The State-of-the-Art of Collaborative Technologies for Initial Vocational Education: A Systematic Literature Review

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Abstract: Future workplaces require collaboration skills in which members of different work communities use technologies to solve complex problems. Vocational education and training (VET) programs need to meet the challenge to prepare students to be part of a competent workforce. Particularly initial vocational education is under pressure to develop learners collaboration skills and abilities. To date, however, no attempt has been made to perform a comprehensive review of the use of computer-supported collaborative learning (CSCL) technologies across different vocational education settings to account for contextual factors of VET.

In this systematic review, 26 published studies were analyzed with respect to their demographics, research methodology, use of technology, and measured outcomes.

This review illuminates that research on CSCL still leaves the vocational learning context as an under-represented field of study. At the same time, technologies offer a range of new types of learning possibilities for vocational education. As the direct result of that development, vocational education is increasingly taking place in new technology-enhanced learning settings.

Education can benefit from the opportunities of CSCL technologies, but on the other hand, such technologies create new challenges for facilitating vocational learning. There-

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fore, this review also identifies three topic areas specific to vocational learning (collaborative writing-to-learn, simulations and game-like solutions, and tangible objects) and enumerates desirable lines for future research.

Keywords: VET, Vocational Education and Training, Initial Vocational Education and Training, Computer-Supported Collaborative Learning, CSCL, Review, Technology-Enhanced Learning

1 Introduction

Collaboration has always been an important element of learning and working. However, what has changed throughout the past decade is the extent to which modern society and global working life require collaboration skills, particularly in technology-enhanced environments (Hämäläinen, Cincinnato, Malin, & De Wever, 2014; Hämäläinen, De Wever, Malin, & Cincinnato, 2015). Frameworks identifying the basic skills for 21st century learning emphasize the importance of collaboration for facing a constantly changing world (Partnership for 21st Century Skills, 2016; Trilling & Fadel, 2009). Research on collaboration date back to earlier research on group-based learning, especially on cooperative learning (Qin, Johnson, & Johnson, 1995). In cooperative learning a task is often divided into subtasks among learners and each of them is responsible for a share of the problem; in the end of problem-solving, these subtasks are combined into a joint output (Stahl, Koschmann, & Suthers, 2006). Collaborative learning takes one step further by focusing on the potential that shared group processes have for learning by merging individual and social processes (Dillenbourg, 1999). Namely, according to Arvaja and colleagues (2007) collaboration refers to a shared knowledge construction in which it is not enough that participants cumulatively share knowledge together, but where the knowledge construction needs to be jointly put together based on others' ideas and thoughts. Current and future working life requires collaboration skills in which members of work communities work together, act effectively across different networks, and make decisions in teams (Lee, Huh, & Reigeluth, 2015). Furthermore, collaborative learning is crucial when adapting and responding to new professional requirements of the radically changing workplace (Billett, 2014). In constantly transforming technology-intensive work environments, collaborative learning is also needed for developing working practices. As a direct result, advancing computer-supported collaborative learning (CSCL) (Cress, Stahl, Ludvigsen, & Law, 2015) is of special importance to meet the requirements of the future working place.

Against this background, initial Vocational Education and Training (VET) is required not only to support the development of professional knowledge (i.e. specific content-knowledge on e.g. marketing, nursing, or electrical engineering) but also to prepare students for their future working lives (European Commission, 2013), allowing them to develop other kinds of skills. Initial VET (also called entry level training) can be defined as vocational education carried out in the initial education system, usually before entering working life (Maclean, & Wilson, 2009). Stamm (2007) showed how vocational

learners are qualified for professional life as they hold “practical intelligence”, which includes both specialized knowledge in the professional domain and its application to practice. Practical intelligence articulates technical, specific, practical skills to “personal characteristics - such as reliability, willingness to take responsibility, social skills, ability to participate, teamwork/player, emotional intelligence, intuition” (Strahm, 2016, p. 43) and therefore constitutes a key factor to comply with the needed qualifications of the labor market. In this respect, VET is under pressure to enhance learners’ collaboration skills.

Additionally, in view of preparing future workers for their jobs, using technology-enhanced learning can be an important driver (Hämäläinen, Lanz, & Koskinen, 2018). On the one hand, technology allows bringing more practice in the training of VET students. Especially in dual systems combining school-based and company-based tracks, technology can be exploited to reduce the gap that learners often perceive among learning locations (Taylor & Freeman, 2011; Eteläpelto, 2008). On the other hand, technology can be used to support collaboration, together with the application and practice of the abovementioned practical intelligence skills and attitudes. Specific models to exploit both these affordances of technology in vocational education have been recently elaborated (Hämäläinen & Cattaneo, 2015).

Therefore, it seems that CSCL may hold great promises for VET. The question is how the CSCL society responds to the needs of VET by meeting the challenges of developing and improving a broad range of collaboration skills needed in working life as well as using technology to cope with these challenges. So far, however, there is no comprehensive research on CSCL in VET. In 2012, the search term “vocational” in ijCSCL resulted in only three studies (Hämäläinen & De Wever, 2013), which illustrates how critically underrepresented technology-supported vocational learning is. The interesting question for advancing VET involves what kind of new knowledge CSCL research produces on VET nowadays. To date, no attempt has been made to conduct a comprehensive review on CSCL across different vocational education settings. To contribute to this discussion, the aim of this paper is to provide a systematic review of studies that are focusing on initial VET within a CSCL context.

2 Research Questions

This paper offers a systematic literature review of the state of art and topic areas of research on computer-supported collaborative learning in the field of vocational education. The review focuses specifically on *initial vocational education*, rather than vocational or professional education in general. More specifically, the following research questions will be investigated:

1. What are the *demographics* of the selected studies on CSCL and initial VET (sample groups, countries, work domains)?

2. What research *methodologies* were used in the selected studies on CSCL and initial VET (type of study, data sources, framework, actors and interactions, and technology design and usage)?
3. What are the measured *outcomes* on CSCL in initial VET (focus of analysis, forms of collaboration)?
4. What kinds of research *topic areas* can be identified applying collaborative technologies for initial vocational education?

3 Methods

First, to answer our quantitative research questions 1, 2, and 3, we have performed a systematic literature review following the guidelines proposed by Kitchenham and Charters (Kitchenham & Charters, 2007). Second, to identify what kinds of topic areas emerge in research applying collaborative technologies for initial vocational education (research question 4), we conducted a thematic content analysis (Braun & Clarke, 2006) of the resulting corpus of empirical articles, using a grounded theory methodology. The aim of the second phase was to identify emergent topic areas that represent findings shared across multiple studies.

3.1 Paper Selection Processes

This study selected relevant papers following a stepwise procedure consisting of nine steps. As the first step, we selected the databases in which to conduct our searches. We searched the following databases: Scopus¹, ISI Web of knowledge², LibHub³, ERIC⁴, Proquest Education Journals⁵, JSTOR⁶, Sciencedirect⁷, and Google Scholar⁸.

Second, we developed the search query. To perform the search, we broke the question down into the context (VET), the type of interaction (collaboration), and the technology. With regards to VET, the title, abstract, or keywords of the papers needed to include either “VET” (as an abbreviation) or “vocational” in combination with “education” or “training” (or both). In addition, with regards to collaborative learning, the term “collaborat*” was included. With regards to TEL, the following terms were included: “technolog*” or “online” or “web-based” or “computer*”. Depending on the databases, search strings were slightly adapted. An example search string used for ISI web of knowledge is: “TS=((VET OR Vocational) AND (education OR training)) AND (collaborat* AND (computer* OR technolog*))”. For some databases, full-text papers

¹Scopus: <https://www.scopus.com/>

²ISI Web of knowledge: <http://apps.webofknowledge.com>

³LibHub: <http://www.libhub.org>

⁴ERIC: <https://eric.ed.gov/>

⁵Proquest: http://www.proquest.com/products-services/pq_ed_journals.html

⁶JSTOR <http://www.jstor.org/>

⁷Sciencedirect: <http://www.sciencedirect.com>

⁸Google Scholar: <https://scholar.google.ch>

could be searched for these terms. Whenever possible (depending on the database), searches were restricted to peer-reviewed papers (e.g. ERIC and Proquest). Only papers written in English were included in the search. The searches were conducted during July and August, 2015. In the end, 823 items were selected (see Figure 1).

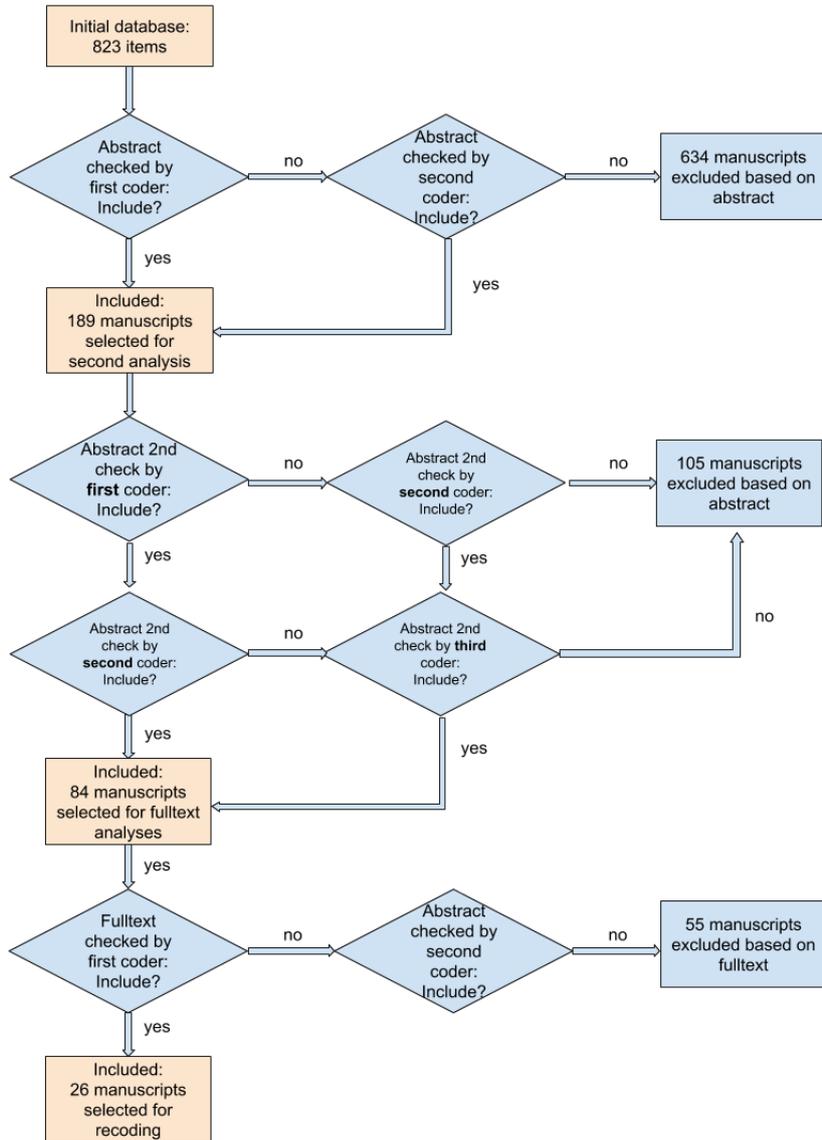


Figure 1: Paper selection process

In step three, we defined the exclusion criteria for manually screening the abstracts. These were discussed among the four authors, and when agreement was reached, they were operationalized in detail. Exclusion criteria were: after reading the abstract, there

is no indication at all that the study is on (1) VET or (2) collaborative learning, or that the study has (3) empirical results and provided adequate descriptions of their methodology. This means that papers were excluded if they did not meet these three criteria.

In step four, all 823 abstracts were screened for inclusion or exclusion. This was done in two phases. First, a first coder (one of the authors of this manuscript) marked all abstracts for exclusion. Second, all abstracts marked for exclusion by the first coder, were randomly assigned to one of the three other authors, who served as a second coder. These were double-checked. If the second coder agreed on the exclusion, the item was excluded. If the second coder disagreed or doubted, the item remained in the database. Duplicate papers (same paper indexed in different databases) were merged. After this third step, 634 items of the 823 were excluded.

Fifth, after a first round of evaluating abstracts in step four, the exclusion criteria were further refined. We decided to keep the aforementioned exclusion criteria, but added that the abstract had to make clear that the study was focusing on initial VET, meaning that studies focusing on professional development, including, amongst others, teacher training, or medical training, were excluded.

The remaining 189 abstracts were re-coded in step six while keeping the additional exclusion criteria. In this step, we first made sure that all abstracts were coded independently by two coders (two randomly selected authors). Disagreements between coders were resolved with the help of a third coder (one randomly selected author out of the two remaining ones). This resulted in 68 abstracts to be included (both coders agreed not to exclude), 54 abstracts to be excluded (both coders agreed to exclude), and 67 abstracts to be double-checked by a third coder, as one of the initial coders in step six would include the paper, and the other one would exclude it. The third coder first coded these abstracts independently, and after that, decided to include or exclude the paper (after discussion with the other coders). When in doubt, the paper was included. In total, 84 papers were selected for full-text analysis.

In step seven, all papers were randomly divided among the four authors for a first full-text screening. Some papers were not available from journal websites (journal subscriptions) or databases. Online search engines were used to track them down, in combination with searches on social academic websites, such as researchgate and academia.edu, personal websites of the authors and direct emails to the authors.

During step eight, 55 out of the 84 selected papers for full-text analysis were excluded after reading the full-text version, based on exactly the same criteria. All of these exclusions were double checked by another coder, which was randomly selected from the remaining three authors. In this way, we derived our final selection of 26 articles. The selection process is depicted in Figure 1.

Last, the final selection of papers was analyzed by all four authors according to the following scheme to answer the research questions (see table 1 and figure 2). Discrepancies in codes were discussed and resolved among the four coders. Overall, discrepancies in this final selection step were rare. The codes distinguish demographics (sample sizes, countries, work domains), research methods (data collection, analysis focus), technology aspects (type, novelty, access), and the measured outcomes of the CSCL.

Table 1: Recoding schema indicating how each of the variables was coded.

Variable	Coding
Participants	Country and sample size (if multiple studies presented in the same paper, the sample sizes represents the sum)
Work domain	Using the 22 domains distinguished by Jungo and Zihlmann (Zihlmann & Jungo, 2015): (1) Nature (agriculture, forestry, animals, environment); (2) Food (food technology), (3) Gastronomy (Restaurants and hotels); (4) Textile (clothing design and production); (5) Beauty and sport (hair, make-up, sport); (6) Design and art (artist, designer, visual communication); (7) Print (print shops); (8) Construction (buildings, bridges, tunnels, streets, railways); (9) Building technology (tinsmith, plumber, janitor); (10) Wood (carpenter, furniture builder); (11) Vehicles (car mechanic); (12) Electrotechnic (electrician); (13) Metal and machines (machine construction, foundry, smith, watchmaker); (14) Chemistry and physics (laboratory, chemical industry); (15) Planning (technical drawer); (16) Business administration; (17) Administration (civil servants, insurances, banks, tourism); (18) Logistics and traffic (logistics, security, police, military, truck driver); (19) Information technology (software developer, computer repairs); (20) Culture (journalist, actor, musician, culture management); (21) Health (nurses, paramedic, medical doctor, dentist); (22) Education and social (teacher, social worker, minister); (23) General studies; (99) Multiple
Research method	Case study (1) (describes individual participants (all in same condition); experimental or quasi-experimental study (2) (compares specific given conditions)
Data collection	Video (1); logging data (2); pre/posttest (3); field-notes/ observations (4); interviews (5); questionnaire/survey (6); learner's artefacts (7); [Multiple answers possible]
Analysis focus	Learning processes (1) (process); learning gains (2) (product); both (3)

Focus on actors	None provided (0); learners (1); teachers (2); supervisors (3); multiple (4)
Framework	Scripting/scaffolding/orchestration (1); problem-based learning (2); boundary-crossing (3); gamification/ game-based learning (4); community of practice/ social presence (5); reflection (6); self-regulation/autonomous learning/ self-efficacy (7); activity theory (8); peer tutoring (9). [Multiple answers possible]
Novelty of technology	Existing technology (1); development and study of new technology (2)
Interaction	Learner-learner (1); learner-teacher (2); learner-supervisor (3); teacher-teacher (4); teacher-supervisor (5); supervisor-supervisor (6). [Multiple answers possible].
Used technology	Not specified (0); online platform (e.g. Moodle) (1); serious game (2); tangible (3); augmented reality (4); blog or wiki (5). [Multiple answers possible].
Type of technology	Not specified (0); mobile (1); desktop (2); web-based (3); hardware (e.g. Tinkerlamp) (4); multiple (5). [Multiple answers possible].

The quantitative analysis was followed by a qualitative thematic content analysis, applying a grounded theory methodology (RQ 4). In qualitative thematic analysis (Braun & Clarke, 2006) there is particular concern with the reliability, firstly, in choosing the most relevant literature, and secondly in identifying topic areas reliably. To identify emerging topic areas across these studies, we used the grounded theory methodology. In analyzing the 26 research articles, we followed Aveyard's (2010) idea of explaining the differences and similarities in the different papers, rather than to simply summarizing them. The methodology allowed topic areas to emerge from the papers, rather than being predetermined through a theoretical framework or a hypothesis. Therefore, for each article, we developed a short summary, assigned keywords, and composed a short statement of the findings. Finally, we (four co-authors) engaged in a process of critical discussion of the emerging topic areas.

Citation	Country	Work domain	Sample size	Research method	Data collection	Analysis focus	Focus on actors	Framework	Novelty of technology	Coll. interaction	Used tech	Type of tech
(Minnaert, Boekaerts, de Brabander, & Opdenakker, 2011)	NL	17	137	1	5; 6	1	4	7	2	1	1	0
(Hämäläinen et al., 2008)	FI	8	64	1	1; 2; 4; 6	2	1	1; 4	2	1	2	3
(Hämäläinen & Oksanen, 2012b)	FI	99	20	1	1; 4	1	4	1; 4	2	1; 2	2	3
(Hämäläinen & Oksanen, 2013)	FI	23	30	1	1	1	4	1; 4	2	1; 2	2	3
(Motta et al., 2013)	CH	16	186	2	6; 7	2	1	1; 7; 6; 9	1	1	5	3
(Chanchalor & Kammeungmai, 2011)	TH	12	92	2	1; 2; 3; 6	3	1	0	1	1	1	0
(Hämäläinen, 2011)	FI	8	48	1	1; 2; 4; 6	3	1	1; 4	2	1	2	3
(Schneider et al., 2011)	CH	18	82	2	1; 3; 6	3	1	1; 4; 2; 3	2	1	3	4
(Valtonen et al., 2012)	FI	99	33	1	7	1	1	6	1	1	1	0
(Jermann et al., 2009)	CH	18	15	1	1	1	1	2; 3	2	1	3	4
(Beers, Kirschner, Boshuizen, & Gijsselaers, 2007)	NL	8	66	1	2; 6	1	1	1; 2	2	1	1	2
(Boldrini & Cattaneo, 2014)	CH	16	111	2	6; 3; 7	3	1	1; 6	1	1	1	2
(Inayat et al., 2013)	PK	19	500	1	6; 7	2	1	0	1	1	1	3
(Gavota et al., 2010)	CH	99	51	2	6; 7	2	1	1; 6; 9	1	1; 2	5	3
(Oksanen & Hämäläinen, 2013a)	FI	23	69	1	6	1	4	1; 4; 5	2	1; 2	2	3
(Oksanen & Hämäläinen, 2012)	FI	23	69	1	6	1	4	1; 4; 5	2	1; 2	2	3
(Oksanen & Hämäläinen, 2013b)	FI	23	86	1	1; 6	1	1	1; 4; 5	2	1	2	3
(Cuendet, Dehler-Zufferey, Ortoleva, & Dillenbourg, 2015)	CH	10	40	2	1; 2; 3; 4; 5; 7	3	1	1; 3	2	1; 2	3	4
(Hämäläinen & De Wever, 2013)	FI	23	20	1	1	1	2	1; 4	2	1	2	3
(Hämäläinen & Cattaneo, 2015)	Mult	99	115	1	1; 4	1	4	1; 3	2	1; 2; 3	1	5
(Hämäläinen et al., 2008)	FI	15	20	1	1; 2; 5; 7	3	1	1; 4	2	1	2	3
(Yang, 2015)	TW	15	68	2	3	2	1	1; 4	1	1	2	0
(Tielman et al., 2012)	NL	16	29	1	4; 5	1	2	0	1	0	0	0
(Ortoleva & Bétrancourt, 2015)	CH	21	42	2	3; 6; 7	2	1	1; 7; 9	1	1	5	3
(Sanz, 2010)	CH	18	49	1	1; 2; 3; 4; 5; 6	3	4	1; 3	2	1; 2	3	4
(Whicte, 2010)	AU	23	20	1	5	1	4	0	1	1	1	5

Figure 2: Overview of recorded papers

4 Results

Quantitative results: inventory of article characteristics

What are the demographics of the selected studies on CSLC and initial VET (sample groups, countries, work domains)?

Sample sizes: Most studies are small scale (less than one hundred participants). Twelve studies have less than 50 participants, nine studies between 50 and 100, four between 100 and 200 and only one more than 200. This large study (Inayat, ul Amin, Inayat, & Salim, 2013) included 500 participants. On average, studies included 79 participants (excluding the outlier 500-participants study, it goes down to 62); median 58 participants (excluding the outlier study, 51 participants). Overall, 2062 participants were included in the 26 papers.

Countries: Most papers have been produced in Switzerland (8 studies; 31%; 605 participants total) and Finland (10 studies; 39%; 459 participants total) (see Table 2). The contributions by Switzerland can be traced back to an extensive national research program supporting studies on CSCL in initial VET contexts. Most studies focus only on one particular country (25 papers), which take country-specificities into account. Only one paper includes multiple countries, but not as a comparison (Hämäläinen & Cattaneo, 2015).

Work domain: In those papers focusing on only one profession, the work domain 'business administration' (4 studies; 15%) has been most frequently studied, followed by logistics (3 studies; 12%). All logistics and most of the business administration studies originated from Switzerland. Other professions include construction and planning (each 2 studies; 8%). One study each referred to woodworkers, electronics, administration, and information technology. It is noteworthy that the majority of papers did not investigate a particular profession: Six studies (23%) referred to 'general studies'. Additionally, 20% reported findings from multiple professions (see table 2). Two studies focused on health professions (one paper reporting on a single context and one on multiple professions).

Table 2: Overview table (by country)

	The Netherlands	Finland	Switzerland	Thailand	Taiwan	Pakistan	Australia	Multiple
Sample size	232	459	576	92	68	500	20	115
Existing technology	4%	4%	15%	4%	4%	4%	4%	
Novel technology	8%	35%	15%					4%
Case study	12%	39%	8%			4%	4%	4%
Experimental study			23%	4%	4%			
Construction	4%	4%						
Wood		4%						
Electrotechnic				4%				
Planning		4%			4%			
Business administration	8%		8%					
Logistics and traffic			12%					
Information technology						4%		
Health			4%					
General studies		19%					4%	
Multiple (*)		12%	4%					4%

(*): Four papers (Hämäläinen & Oksanen, 2012; Valtonen et al., 2012; Gavota et al., 2010; Hämäläinen & Cattaneo, 2015) reported on multiple professions. To avoid counting each profession separately, these papers are reported under ‘Multiple’.

What research methodologies were used in the selected studies on CSCL and initial VET (type of study, data collection, framework, actors and interactions, and technology design and usage)?

Type of study: About two thirds of the reviewed papers describes case studies (18 papers; 69%); only about one third of the papers described experimental (or quasi-experimental studies (8 papers; 31%). The countries with the most case studies are Finland (10 studies; 39%) and the Netherlands (3 studies; 12%); most experimental studies were conducted in Switzerland (6 studies; 23%) (see Table 2).

Data collection: The three most popular methods for data collection were questionnaires (15 studies; 24%), video (13 studies; 21%), and artefacts (8 studies; 13%). Other forms of data collection include fieldnotes and pre/posttests (each 7 studies; 11%) as well as log data and interviews (each 6 studies; 10%). The majority of studies (n=18) combined multiple forms of data collection.

Frameworks: We investigated if the reviewed studies used other common theoretical frameworks, beyond ‘collaboration’. The most frequently used frameworks were ‘scripting/ scaffolding/ orchestration’ (20 studies; 39%) and ‘gamification/ game-based’ (11 studies; 21%). Other frameworks were ‘boundary crossing’ (5 studies; 10%), ‘reflection’ (4 studies; 8%), and ‘peer tutoring’, ‘self-regulation’, ‘problem-based learning’, and ‘community of practice’ (each 3 studies; 6%). Two studies used only one framework; 13 studies used two frameworks, and 7 studies combined more than two frameworks. Four studies did not refer to a specific framework.

Actors and interactions: The majority of studies focused on students (16 studies; 62%) and only two studies (8%) on teachers. Eight (31%) studies included both teachers and students. Similarly, most studies focused on (collaborative) student-student interactions (25 studies), eight studies on student-teacher interactions, and only one study included student-supervisor interactions (see Table 3).

Table 3: Focus of studies (by frequency and percent)

	Case study			Experimental study
	Studentfocus	Teacherfocus	Both	Studentfocus
Process	4 (15%)	2 (8%)	7 (30%)	
Outcome	2 (8%)			4 (15%)
Both	2 (8%)		1 (4%)	4 (15%)

Technology: When dealing with the application of vocational learning in CSCL, a distinction can be made between the design of new technologies to support learning and the use of existing technologies. Following this distinction, 10 studies explored how to make use of existing technologies (38%). On the other hand, 16 studies presented novel tech-

nologies (62%) for enhancing learning in vocational contexts. The two most frequently used forms of collaborative technology are serious games (10 studies; 38%) and online learning platforms (8 studies; 31%). Serious games were typically based on authentic worklife situations and applied to learn holistic work processes, such as organizing an event (e.g. (Hämäläinen & Oksanen, 2012a; Oksanen & Hämäläinen, 2014), practicing electrical installation process of a house (Hämäläinen, 2011), solving tasks in the area of work safety (Hämäläinen, Oksanen, & Häkkinen, 2008), or demonstrating the design process of surface treatment (Hämäläinen, 2008). Other technologies were tangibles (4 studies; 15%) and blogs/wikis (3 studies; 12%). The former were mainly used to support writing-to-learn collaborative activities to foster reflection on specific professional situations the participants personally lived at the workplace; this was applied to identify causes and possible solutions for faulty X-rays with dental assistants (Gavota, et al., 2010), to analyze critical incidents with social and health care assistant (Ortoleva & Bétrancourt, 2015), and to gain deeper knowledge of the what and whys of the main steps of a procedure in the commerce field (Gavota et al., 2010; Motta et al, 2013). The latter were ad-hoc built solutions to address specific topics in the logisticians' (Schneider et al., 2011; Sanz, 2010; Jermann et al., 2009) and carpenters' (Cuendet et al., 2015) curricula. One study (Tielman, den Brok, Bolhuis, & Vallejo, 2012) did not specify any particular technology as students accessed a range of different online sources. These observations align with the type of technology (see Table 4).

Thirteen studies described browser-based technologies (e.g. Moodle, Facebook, etc.) (50%) and 2 studies (8%) desktop software (see table 4). However, several studies did not specify how their technology was accessed (5 studies; 19%) or mentioned multiple technologies without providing details (2; 8%). Four studies used custom-built hardware (the previously mentioned studies on tangibles by the DUAL-T group) (15%).

Novel technologies were mostly explored through case studies (14 studies; 54%) (and 2 experimental studies, 8%), while existing technologies were explored through experimental studies (6 studies; 23%) and case studies (4 studies; 15%).

Table 4: Technology access and type (by frequency and percent)

	Not specified	Desktop	Webbased	Hardware	Multiple
Online platform	3 (12%)	2 (8%)	1 (4%)		2 (8%)
Serious game	1 (4%)		9 (36%)		
Tangibles				4 (16%)	
Blogs/Wikis			3 (12%)		
Not specified	1 (4%)				

What are the measured outcomes on CSCL in initial VET (focus of analysis, forms of collaboration)?

Focus of analysis: Most studies focused on describing and analyzing learning processes (13; 50%). Half as many studies described the outcome (e.g. learning gains) (6; 23%). Seven studies included both process and outcome (27%) (see Table 3).

Collaboration - Definition and description: All reviewed papers included a form of collaborative learning. However, it is of note that most papers do not provide a definition of their core term ‘collaboration’. Out of 26 papers on CSCL in VET, only five papers provided a definition. In the five studies defining collaboration, there seems to be no shared definition of collaboration. In the reviewed papers, we can distinguish between ‘collaboration’ and collaborative learning’. Bromme (2000) defined collaboration as “negotiating common ground”. Other papers used the term collaborative learning’ instead. Kuriyama and Sakai (2007) described collaborative learning as “collaborative and mutually interdependent learning, where the learners help each other and fosters individual learning responsibility within the group’s activities to realize group objectives”, while Johnson and Johnson (1994) defined collaborative learning as “a learning methodology based on students working together as a group to accomplish shared learning goals rather than an individual student achieving learning goals alone”. Two papers referred to a definition by Dillenbourg (1999), who defined collaborative learning as “building shared knowledge through group activities, in which the participants are committed to or engaged in shared goals and problem solving”. Studies that did not define collaboration, referred to related processes such as interaction, knowledge sharing, elaborative questioning, explaining, and reasoning.

Content analysis of findings: three emerging topic areas

In the following, we introduce three topic areas that emerged from the papers, which are specific to vocational learning: 1) collaborative writing-to-learn, 2) game-like solutions (gamification) and simulations, and 3) tangible objects in combination with augmented reality. These three topic areas found in current CSCL research are grounded in identifying how technologies are used in the selected studies and their intersections with collaboration and expected outcomes. These topic areas arose from the professional specificity of the learning objective (general vs specific), the kind of technology used (novel vs existing) and the kind of design of the collaboration in the learning task.

In the first topic area, studies focused on collaborative writing-to-learn and existing everyday technologies (like weblogs and wikis) were used to test the effectiveness of specific pedagogical scenarios on peer writing and/or peer commenting. Namely, collaborative writing-to-learn (Galbraith, 1999; Hayes & Flower, 1980), i.e. the use of writing to foster reflection on one’s own (professional) experiences (Boscolo & Mason, 2001; Kember et al., 1996; Tynjälä, Mason, & Lonka, 2001) was applied. Two of the studies addressed the field of commerce, two healthcare professions, and one included both domains. In this first area, existing technologies were exploited for their ability to have peers compare themselves to each other through texts (e.g. Gavota et al., 2010).

Contents are specific to the profession and objectives aim at developing declarative and procedural professional knowledge in the domain.

In the second topic area, gamification technologies were designed to enhance both discipline-independent skills (e.g. Hämäläinen & Oksanen, 2012) and discipline-specific skills (e.g. Hämäläinen, 2011). In practice, simulations and game-like solutions offered quasi-authentic ways to practice a variety of collaboration skills, such as inter-professional task-solving between different professions (e.g. Hämäläinen & De Wever, 2013). In these studies, solving problems usually involved interactions with others and was motivated by shared concerns and goals (Dillenbourg, Järvelä, & Fischer, 2009; Littleton & Mercer, 2013). On the other hand, we have to consider that discipline-independent skills are not separate from content but always connected with discipline matter (Silva, Goel, & Mousavidin, 2009). With discipline-specific technologies, the idea behind the design of most of these environments was typically to offer a virtual environment allowing students to practice work situations that would otherwise be almost impossible (e.g., practicing the danger of electrical shocks), or too expensive to arrange (e.g. Hämäläinen, 2011). Given that there are many discipline-related learning activities within VET, different technological applications can present opportunities for designing collaborative learning that directly meet the future workplace needs. Currently, in this simulation and game-based research, collaboration scripts (Kobbe et al., 2007) have often been integrated into the game story to induce and develop discipline-independent and discipline-specific skills. Thus, learning games were designed so that collaboration was needed to solve the proposed problem or situation – meaning that each member of the group playing the serious game had to give her own contribution to be successful, as is increasingly the case in many VET programs.

In the third topic area, tangible objects and augmented reality were developed to meet discipline-specific professional needs and specific learning goals (e.g. in the field of logistics, see Jermann et al., 2009). Collaborative problem-solving tasks were designed to support the learning of content that is not transferable to other professions.

Taken together, these three emerging areas suggest that CSCL can be an interesting framework to apply to initial VET, especially for the development of professional skills. Depending on the specificity of the learning objective(s), this can be done both with existing and novel technologies. In the following discussion section, we present additional insights that arose once we analyzed the three main components of our analysis (technology, collaboration, and learning) independently.

5 Discussion

Work environments are undergoing radical changes. The extent to which changes in global working life require collaboration skills is a new element in today's technology-enhanced work-settings (Tynjälä, Häkkinen, & Hämäläinen, 2014). As a direct result, collaborative skills, practice-based interactions (e.g. Noble & Billett, 2017) and technologies are increasingly important at the workplace. Students and apprentices need to learn how to operate in such changing and complex environments; VET systems are

challenged to prepare them to develop skills and abilities on how to use and take advantage of various kinds of technologies (Harteis, 2018) The current review investigated the state-of-the-art of CSCL research in initial VET. This led us to identify three research questions (RQs 1-3), starting from an analysis of the general demographics of the selected studies and then leading to investigations of the different components of our topic, namely technologies, collaboration and learning.

Although the field of VET seems to be an interesting area for investigating how collaborative learning and technology can advance students' and apprentices' knowledge, there are surprisingly few CSCL papers focusing on initial VET. One important conclusion of our research is thus that VET remains an under-researched field of study in CSCL society. Most research in CSCL has been conducted in K12 and higher education contexts. The strength of our review is therefore that it clearly highlights the need for additional studies in initial VET contexts. Our final corpus included only 26 papers, most of which (more than 60%) originated from two main research groups in Finland and Switzerland. The dominance of these research groups is partly due to the commitment of funding agencies. In the case of Switzerland, an extensive research program was launched in 2009 to investigate different aspects of VET. The research focus of these two groups also affected the selection of professional domains involved, which would otherwise be scattered across a wider spectrum.

With regard to our review, the following limitations need to be considered. First, the lack of an extensive corpus of studies may be due to our restriction criteria related to the language of publication: having included only research published in English might explain the absence of studies from countries with a long tradition in VET but only publishing in their original language. It was surprising, in fact, that our systematic literature search did not lead to papers from Germany. Second, the restriction to initial VET has excluded research conducted on general vocational education, higher professional and tertiary vocational education, such as medical and teacher training. Third, we analyzed research focusing on collaborative technology, with the consequence of excluding other technologies, such as online learning journals for individual use. Future research could address these limitations by conducting an extended fulltext search in different languages, by including additional databases, and by extending the search terms to vocational education in general (instead of focusing on initial VET) and professional education. Different or extended selection criteria could lead to a wider corpus of papers. Our selection criteria and coding scheme allowed us to answer our specific research questions (demographics, methodologies, measured outcomes, and research topic areas). Future research could extend this work by asking additional, different research questions. One suggested area of research would be a comparison between the used technology, the vocational context, and the educational activity.

Despite these limitations, our study has several strengths. First, we focused on the technological component. The typical challenge in this respect was to find ways to make use of the added values of technologies as grounds for developing skills and abilities needed in vocational learners' workplace. Technology enabled new kinds of activities to supplement traditional vocational classroom and workplace practices. For example, mobile tools were introduced to bridge the physical boundaries of the school and workplaces

(Cattaneo, Motta, & Gurtner, 2015). 3D spaces provided safe environments to practice dangerous team-work practices e.g. at the construction sites (Hämäläinen, 2011). In our sample, technologies provided the possibility to deal with abstract complex tasks by reproducing concrete objects through tangibles and elaborating data provided by them through augmented reality (e.g. Schneider, Jermann, Zufferey, & Dillenbourg, 2011). Moreover, technologies enabled the elaboration of group tasks to learn holistic work processes through simulating them in a secure, game-based environment (e.g. Hämäläinen & Oksanen, 2012) or supported confrontation and the analysis of erroneous practice among peers using photos and writing (e.g. Gavota et al., 2010). In all cases, the specificity of technologies is also put to use in vocational education to integrate school- and work-based knowledge and to favor boundary crossing (Akkerman & Bakker, 2011) across learning locations. Second, when focusing on collaboration, we noticed the absence of a common framework on how to design both collaboration and collaborative learning. Beyond CSCL, it seems that other frameworks are more central in VET research even when collaborative learning is used to design the studies. This leads to the hypothesis that a more specific framework for CSCL in VET is still needed and that studies specifically addressing the topic of collaboration and collaborative learning in initial VET are necessary. One could argue that no specific framework for CSCL in VET is required; however, collaboration is analyzed mostly at the learner level, and therefore interpreted as a process taking place among students without involving other VET-stakeholders, such as teachers and in-company supervisors. Specifically, this combination of school- and work-based actors (teachers and supervisors) and actions (intertwining learning activities at both locations) is what makes VET unique as a specific field. In our opinion, current research and practice often neglect the possibilities/opportunities to investigate the role of collaboration in vocational education, where the interaction between people in different locations is fundamental for the effective functioning of the (dual) systems.

Third, with respect to learning, we observed that only a minority of studies investigated both the processes and the products of learning. It is much more common to focus on only one or the other. Additionally, learning is often conceived as self-regulation and reflection. Although collaboration is always investigated from the learner's perspective, as highlighted before, the dynamics of learning are often examined from the teacher's perspective: it is not by chance that papers can be associated based on frameworks like teacher orchestration, scaffolding or scripting. Finally, we identified topic areas in research applying collaborative technologies for initial vocational education (RQ4). All three emerging topic areas showcased different uses of collaborative technologies for initial VET. Learners can learn collaboratively through writing activities, game-like learning environments, simulations, and augmented realities. To successfully apply each topic area, researchers needed to identify the specific characteristics of each initial VET context. On the technological side, these topic areas were applied with existing or novel technologies. The CSCL framework guided the implementation of these topic areas by providing a structure for the design of the technology, the form of collaboration, learning activities (input), learning objectives, and learning gains (outcome). This supports our perception that CSCL can serve as a useful framework for the design of studies in the field of initial, or also other forms of, VET.

6 Conclusions

Taken together, our results suggest the existence of many opportunities for establishing a specific field of research on CSCL in initial VET. On the one hand, it can benefit from investigating the intersections between vocational practices, learning specific work-related skills (motor skills, factual knowledge, procedural knowledge) and general skills (soft skills, social and communication skills). On the other hand, a theory-based, VET-specific framework needs to be developed that informs technology design and its crossings with collaboration and learning processes. Initial VET is a fascinating field of research, with many implications, both for educational and professional contexts. Nevertheless, the CSCL community has just begun to notice the potentials it can offer. We hope that the current review can inform further research by identifying possible streams of research and fostering CSCL VET research in the upcoming years.

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Vocational Teaching-Learning through the Eyes of Undergraduate Vocational Students in Malta: A Qualitative Exploratory Study

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Abstract: The purpose of this study is to develop a deeper understanding of the teaching qualities of effective lecturers that vocational students desire, students assessment preferences and preferred learning environments. This study gives a voice to higher vocational students as it is important for vocational educators to learn what attracts students to effective learning.

Due to the inquiry's exploratory nature, an interpretivist approach was used, and a constructivist grounded approach using qualitative data was adopted. A purposive approach to multiple case study selection was used where the unit of analysis was a higher vocational student. The perceptions and expectations of vocational undergraduate (EQF level 6) students in two disciplines (applied science and engineering) were explored, to identify what may constitute good practice. A total of ten participants from two different institutes within the vocational university college agreed to be interviewed. Semi-structured and photo-elicitation interviews were applied. In addition, the Powerful Learning Environments (PLEs) Framework was used as a preliminary tool to aid in the decision-making process for data collection. Iterative analysis was used for the semi-structured interviews, whilst a constant-comparative method was used for the photo-elicitation image analysis.

Overall, the expectations and preferences between both groups were very similar. Results show that students expect to be taught by interactive lectures that relate theory to practice that will prepare them for the job. Formal lectures including presentations were the least favoured. Regarding teaching qualities, students expect approachable and

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understanding lecturers who provide concrete industrial examples. Assessment preferences included home based assignments and research projects. The preferred learning environment is in line with most characteristics of the Powerful Learning Environment.

Evidence shows that there is no particular difference between a higher vocational student and a higher education student. Implications for the enhancement of students' learning processes are discussed and recommendations for further research are elaborated.

Keywords: VET, Vocational Education and Training, Higher Vocational Education, Teaching Quality, Student Expectations, Photo-Elicitation, Learning Environments

1 Introduction

More studies need to explore vocational students' expectations and opinions of quality teaching. Despite a growing number of studies on the effectiveness of teaching and quality within the vocational education context (e.g. Misbah et al., 2015; Placklé et al., 2014), the higher vocational education context is under-represented. Therefore, the research reported here aims to respond to this gap in the literature by contributing to the practical knowledge of quality teaching within a Maltese higher vocational education institution. The purpose of this study was twofold and its main research questions are:

1. What are the students' perceptions of effective vocational teaching in terms of:
 - a) Lecturers' personality characteristics;
 - b) Lecturers' behaviour and knowledge;
 - c) Students' needs and expectations;
 - d) Assessment/coursework preferences?
2. What are the students' preferred learning environments?

Strengthening vocational education within the European Union is of utmost importance, and this could be achieved by implementing a cohesive, vocationally oriented pedagogic-didactic approach. Competence-based education within Vocational Education and Training (VET) systems is the leading paradigm for educational innovation (Biemans et al., 2004). The term 'competence' can be described as the combination of knowledge, skills and attitudes needed to perform well in a particular situation within a profession (Verhaeghe et al., 2011). The career of vocational students must be central to this approach. Thus, in order for students to develop competences and develop their career, learning programmes must include a 'community of practice' as an essential learning arrangement. This results in constantly shifting the boundaries of institutions for organised learning around the careers of vocational students. Having such a learning arrangement might lower student dropout rates since students will find their learning experience attractive and relevant. This is considered to be effective teaching as it ensures that the surface approach to learning is replaced by deeper learning, which consists

of analysing, developing, creating and demonstrating work. This will eventually lead to a population having higher qualification levels. In fact, the main aim of policy makers is to reduce dropouts by strengthening vocational education and ensuring a widely employable population (de Bruijn, 2004).

According to Billett (2001), vocational education curricula should include pathways of participation in social practice. Vocational expertise ('knowing in practice') can only be developed if students have the opportunity to access and participate in practice. Where social practice is central and enacted in curricula, students are made aware of their own role in learning. This learning approach results in two basic principles: emphasis on a school-based and initial education, and the perspective of career as a guiding principle. This implies that both principles cannot be reconciled on every point. The work of vocational educators is fundamentally changed due to such new learning arrangements, which result in dilemmas and practical tension experienced by these educators.

To support students' learning, educators benefit from knowing and understanding what students perceive of teaching and learning (Dahl, 1995); according to Hill (1995) and Sander et al. (2000), student expectations are a valuable source of information. Therefore, students' voices need to be heard; acting upon them might increase quality in teaching within vocational education and training (VET). In addition, students can be informed by the respective universities of realistic expectations from lecturers (Hill, 1995). Quality in teaching is also reported to be enhanced when the vocational undergraduate curriculum is evaluated and redesigned according to the students' expectations as well as the requirements of careers (Dwyer, 2001). Telford and Masson (2005) also point this out, where the perceived quality of educational services depends on students' expectations and values. Such studies reflect the importance of understanding students' expectations and perceptions within higher vocational education.

This paper begins by reviewing the literature related to the above-mentioned foci towards effective teaching and learning within both the higher and vocational education context, as well as learning environments' characteristics. De Bruijn and colleagues' (de Bruijn & Leeman, 2011; de Bruijn & Overmaat, 2002; de Bruijn et al., 2005) conceptual framework related to powerful vocational learning environments is adopted to look at students' ideas of preferred learning environments. Semi-structured and photo-elicitation interviews are applied with 10 students from two different disciplines (applied science and engineering) to develop a deeper understanding of their expectations and perceptions. The study uncovers constructs that underlie higher vocational students' expectations, and argues that there is no particular difference between a higher vocational student and a higher education student. This paper concludes with a discussion of the research findings, limitations together with future work.

2 Teaching Quality in Higher Education and Vocational Education

Lecturers' personality characteristics

The lecturer and their personality play a major part on the students' learning and their preferences. According to Trammell and Aldrich (2016), the characteristics of personality can be understood as innate within the lecturer regardless of subject content and level of education. The personality of the lecturer reflects who the person is regardless whether lecturing in class or outside.

One very important attribute of a lecturer described by students is empathy (Jaasma & Koper, 1999). The majority of other studies also support this claim; indeed, empathy was consistently a desired characteristic of lecturers by students (Anderson, 2000).

Other studies have also suggested that students prefer enthusiastic lecturers (Anderson, 2000; Sander et al., 2000). The willingness to answer to students' questions was also preferred, including being flexible and adaptable to all students (Voss et al., 2007). Faranda and Clarke (2004) have also reported that students are mostly satisfied with respectful lecturers who build a rapport.

Such characteristics represent a broad spectrum of communication practices that lecturers use to meet their own goals and students'. The following is a discussion pertaining to the competence and expertise of lecturers.

Lecturers' behaviour and knowledge

Students are still unsatisfied with the programme if their lecturers lack organisational skills, even if they have ideal personality characteristics and are knowledgeable in their field (Shea et al., 2003). Pepe and Wang (2012) also report that students highly value organizational skills even when it comes to the seated positions within class. They describe that an organised seating position helps in the communication of knowledge between lecturers and students.

Apart from having well designed courses and organised lecturers, students look for prompt feedback on their work from their respective lecturers. Hounsell (2003) describes that when students have a sense of what they are doing right and wrong, they learn more quickly and efficiently. Avoiding giving feedback on time allows for the wrong information to be held, and in effect, will be more challenging for students to correct themselves. According to Hara (2000), student's frustration and level of anxiety can increase due to lack of feedback, especially with online courses.

Voss et al., (2007) declared that the overall student satisfaction and student learning depends on lecturer's expertise and competence, together with their teaching skills and pedagogy used. 'Teacher immediacy' (Andersen, 1979) and 'relevance' (Frymier & Shulman, 1995), together with 'credibility' (McCroskey & Young, 1981) are all behavioural characteristics that students look out in their lecturers. Behaviours such as verbal and nonverbal immediacy are associated with positive affective learning (Witt et al., 2004), student motivation (Frymier, 1994) and participation (Rocca, 2009).

Ustunluoglu (2017) stated that although the number of studies on the effectiveness

of quality teaching within higher education is growing, reports by international agencies still show that more work is needed with regard to meeting expectations in teaching quality, specifically to lecturers' application of pedagogical knowledge. Universities should develop quality teaching by enhancing pedagogy, support for student learning and providing continuous education for faculty members (Henard, 2010). Hatakenaka (2006) highlights that there are still lecturers who use outdated methods in the classroom and take only into consideration 'what to teach' rather than 'how to teach'. Thus, pedagogic research is of outmost importance to develop lecturers within both higher education and vocational education. Student preferences will be examined in the following section.

Students' needs and expectations

Evaluations of teaching appropriateness together with expectations (Houser, 2005) have been one way in which scholars examined the goals and needs of students within the classroom. Houser (2005) reported that both traditional and non-traditional students experienced some discrepancies between what they expect from their lecturers and what they actually get. One reason for these differences is the fact that both lecturers and students have differing views about what students want and need in order to succeed. The primary fact is that researchers and lecturers are still not sure of the lecturer behaviours and characteristics students desire. Researchers, particularly in the vocational section can understand more the comparative importance of teaching variables and thus provide ongoing implications regarding how lecturers should behave, by determining students' preferences and how students prioritize certain behaviours and characteristics. Goldman et al. (2017) have addressed how students prioritize instructional behaviours and characteristics with varying resources. Their findings indicated that students prioritized the following qualities in their ideal instructor: clarity, competence, and relevance.

However, according to Trammell and Adrich (2016), there are individual differences within students that impact individual preferences for lecturers' qualities. Their results suggest few differences within and between their two groups of students (first-generation college students and non-first generation college students). Students have unrealistically high expectations for lecturers, which is unlikely for lecturers to meet all expectations, resulting in leaving students disappointed or unsatisfied with the programme (Trammell & Adrich, 2016). What follows is an exploration of students' assessment preferences.

Assessment/coursework preferences

Competence-based education, together with various assessment methods are being implemented in many institutions of higher vocational education in order to capture the competence development (Baartman et al., 2013). Such a system should reduce the gap between what students learn in the institution to what is needed in the workplace. According to Griffith and Guile (2003), employers look for reflective practitioners that possess an adequate knowledge base in order to solve complex problems. In addition, these employers also want individuals to develop and acquire new knowledge in order to enhance in their career. However, assessment preferences pertaining to higher vocational students need yet to be identified, especially since assessment has an important impact on the students' learning.

Pereira et al. (2016) have investigated students' perceptions about assessment, especially how it is put to practice. Their findings indicated that students had similar ideas about assessment. Most students responded that assessment is the verification of knowledge and learning. Birenbaum (2007) investigated the relationship between test anxiety and learning strategies with assessment preferences of undergraduate students. The results show that assessment preferences varied between students. The role of learning environments in quality teaching will be discussed next.

3 The Role of Learning Environments in Quality Vocational Teaching

Vocational education needs to teach students to integrate knowledge, skills and attitudes (Baartman & de Bruijn, 2011) whilst simultaneously developing a professional identity (Geijsel & Meijers, 2005). Two important learning environments to acquire and integrate these types of knowledge, skills and attitudes are vocational colleges and workplaces which provide an environment for authentic learning (Gulikers et al., 2008) and self-direct learning (Kicken et al., 2008). Authentic learning is considered to be learning through the application of knowledge in realistic contexts. Therefore, authentic learning makes use of authentic tasks where the assignments given to students are taken from vocational practice (de Bruijn & Leeman, 2011). Authentic learning within VET is considered to be effective learning. Such an environment is called a 'powerful learning environment' (PLE). PLE is defined as a learning environment which stimulates growth, bring learners just a little further than they might manage on their own power (de Bruijn, 2012, p. 643). Within a PLE, students ought to be allowed to optimally develop their own competencies, not only for career related problems, but also for their own personal development. Indeed, according to Griffiths and Guile (2003), connecting learning between school and the workplace is of utmost importance, as learning is taking place in social practices to allow students to develop their vocational identity and expertise.

Placklé et. al (2014) aimed to study and investigate what students prefer with regard to the design of the learning environment within the secondary vocational education context. They developed an instrument to measure secondary vocational students' preferences on characteristics of powerful learning environments (PLE) in vocational education. Findings indicate that the preferences of these students support most characteristics of PLE within vocational education. Additionally, it was concluded that teachers have to challenge their students and encourage them to take ownership of their own learning. development. The following section will discuss the theoretical model of powerful learning environments.

4 Powerful Learning Environments Framework

This paper uses this model as a preliminary tool to aid in the decision making process for data collection with regard to the second research question. This research will investigate how the stakeholders in this study respond to the characteristics of PLEs

The concept of PLEs was introduced by De Corte (1990), who refers to learning environments that are designed in a way which foster the necessary learning process to achieve the desired learning outcomes (De Bruijn et al., 2005; De Corte 1990). De Bruijn and colleagues (De Bruijn and Leeman, 2011; De Bruijn and Overmaat, 2002; De Bruijn et al., 2005) constructed a model of powerful learning environments for vocational education. This was a result of previous research projects on competence-based vocational courses in various disciplines such as business administration, health care and technology.

The aim of PLEs was inspired by sociocultural theory in order to develop the vocational identity (Billett, 2001). The model of PLE comprises a mix of traditional features such as instruction, active and reflective learning. The features used in the study are:

1. Programme characteristics:
 - a) Vocational identity is formed as the starting point of learning
 - b) Authentic learning
 - c) Learning programmes should be designed in a manner where constituent parts such as theory and practice relate to each other
2. Learning activities of students:
 - a) Meaningful, flexible knowledge, and skills should be developed by students for competent professional behaviour. With an authentic and challenging curriculum, constructive learning is stimulated
 - b) Students develop an autonomous work attitude and vocational habitus through reflective learning, which is achieved when students reflect on their learning and work related experiences with peers and lecturers
3. Guiding activities of teachers should:
 - a) provide adaptive instruction and act as a role model with regard to the acquisition of vocational knowledge and experience,
 - b) coach students by critically guiding them in an explorative, reflective and cooperative learning manner, and
 - c) help students to develop and sustain self-discipline and motivation.

The following section will describe the research design and methodology together with the methods that have formed this study.

5 Research Design and Methodology

Due to the inquiries exploratory nature, an interpretivist approach was used, and in particular a constructivist grounded approach using qualitative data. In the above reviewed literature, the methods used to collect data are mainly of both qualitative and quantitative nature. Furthermore, a recent shift away from monomodality in ‘Western’ culture was pointed out by Kress and van Leeuwen (2001). A cultural emphasis on textual practices with more importance placed on text-based genres was dominated in the past. They argue that this approach has begun to shift, and multimodality is making its appearance in various documents and other types of social practices.

One important element in this process has been the gradual ascendancy of the screen over the book as the predominant mode of presentation in many spheres of life, bringing with it a greater emphasis on non-textual images and visual layout. (Gourlay, 2010, p. 80)

However, although higher education communication has shifted to the screen and involves the visual and multimodal aspect of communication, there is a scarcity of research considering the visual and multimodal aspects of higher education teaching and learning. This is also the case with studies applying visual research methods to investigate teaching-learning as a complex multimodal practice, in particular in relation to vocational education. A unique approach of data gathering was used in this study. This involved a qualitative approach consisting of semi-structured photo-elicitation interviews.

5.1 Participants and Sample Size

A purposive approach to multiple case study selection was used where the unit of analysis was a higher vocational student. For the purposes of this study, students had to be enrolled in an undergraduate vocational degree programme. For the purposes of this study, students had to be enrolled in an undergraduate vocational degree programme. As a vocational lecturer employed in Malta’s main vocational college, and having an emic perspective within this study, I decided to invite (via e-mail) all first year and final year students in two institutes within the university college, outside of the institute I work in. This approach increases the validity of the research project and omits bias. A total of ten participants from two different institutes within the vocational university college agreed to be interviewed. There were four first year students that did not reply to my e-mail and hence did not participate in this study. Five first-year Bachelor’s degree students were studying at the institute of Applied Science, whilst the other five participants were in their final year of their Bachelor’s degree, studying at the institute of Engineering and Transport.

The participants of this study are nine males and one female: Adrian, Bernard, Charles, David, Edward, Francis, Gareth, Hubert, Ian and Jane (all pseudonyms). Five of them happened to be a whole group in their final year of engineering. The other five are in their first year of their degree studying within the institute of Applied Science.

Their ages range from 18 years old and 25 years old. Some of these students joined the vocational college exactly after completing the compulsory education, while others joined the vocational college after spending a year or two at the University of Malta reading for academic degrees. This data was collected during the individual interviews with those who participated in this study, where students were encouraged to give a brief overview of their educational experience after they had completed compulsory education.

5.2 Methods and Data Collection

This was carried out at the institute of Engineering and Transport and the institute of Applied Sciences in Malta's main vocational college during the second semester of 2016-2017 academic year. Classical interviewing technique was used to answer the first research question and photo elicitation interview to answer the second research question. Participants were interviewed individually at their respective institute by myself, and were informed that they could withdraw from the interview at any time. Interviews were digitally audio-recorded and transcribed word for word, for data analysis. These transcriptions helped me develop a deeper understanding of the emerging discourse during the semi-structured interviews and the image-reflectivity task. All transcriptions were sent to the participants for their perusal before data analysis. These interviews lasted approximately 45 minutes each. Some of the quotations used in this paper have been translated from Maltese.

The use of visual data may be a powerful mode for the reflexive investigation of preferred learning environments. I have chosen to use photo-elicitation methods for the second research question. A focus on images may provide research participants with a means by which to express complex experiences in an indirect, metaphorical or less threatening way. Prior to the interview, participants were encouraged, to produce an image of their preferred learning environment. This image was then discussed during the interview. The meaning making process and aim was to uncover the hidden aspects of their experiences, which acts as a verification method of the previously discussed questions during the semi-structured interview and to empower participants.

These two methods combined together provided a powerful tool for the participants to think about their perceptions and expectations of vocational teaching-learning, and is also a powerful tool for myself to better understand their thoughts and beliefs.

5.3 Ethical Considerations

All educational research guidelines and ethical rules have been followed. Ethical approval from the Head of University College was granted on 3rd March 2017, and participants were given full information pertinent to the study. In addition, participants were assured pseudonyms would be used, and that any comments or quotations used in the published research would be anonymous.

5.4 Data Analysis

Iterative interview analysis

To answer the first research question, and analyse the transcripts of the semi-structured interviews, an iterative analysis derived from Flick's (2002) process was carried out. This analysis was partly thematic and partly content analysis. Data for this method was examined for shared patterns that had developed. The process consisted of the following: re-coding of data; searching; discovering relations, tendencies and patterns; categorising and comparing information.

Photo-elicitation image analysis

To answer the second research question, visual methods were used via the photo-elicitation interviews. The images that students provided during the semi-structured interviews were analysed along with the transcripts of the image reflectivity task. Analysis of this data was also based on qualitative methods where a constant-comparative method was used to determine patterns or themes in the images (Merriam, 1998). Such a method involves comparing one segment of data with another in order to determine whether there are any similarities or differences. Then, data are grouped together according to the similar dimension (Merriam, 1998). Domains of artifacts were established and thematic categorical patterns were drawn from each domain. These will be discussed next.

6 Findings

RQ 1: What are the students' perceptions of effective vocational teaching in terms of: lecturers' behaviour, knowledge and personality characteristics; students' needs and expectations; and assessment/coursework preferences?

For the first research question, participants were first asked to comment on what they understand by the term 'effective'. Most found it hard to explain this, and immediately started mentioning examples of effective teaching and learning. However, their main answer was that since they are vocational students, effective teaching and learning is when they can relate the learning at the college with what they will be practicing in their career. In fact, Hubert mentioned that effective teaching is when teaching is both theoretical and practical. On the other hand, Gareth mentioned that effective teaching is how well students absorb what lecturers teach, irrespective of any particular methods.

Lecturers' behaviour, knowledge and personality characteristics

After commenting on what effective teaching and learning means to them, they were invited to share their experiences of effective teaching and learning methods. All participants mentioned 'group work'. Adrian stated that:

Yes, I did experience effective teaching and learning. Sometimes working in a group and finding what you need to learn by yourself, it helps me more. If

the lecturer just explains and the students simply write what is being written on the whiteboard I will surely not learn anything.

Edward mentioned that effective teaching and learning is when a lecturer relates the explanations in class to something in reality, and uses images in presentations to help students visualise. In addition, almost all participants mentioned that they prefer visual learning to text-based learning. Another mentioned method is interactive lectures. Indeed, all prefer lectures to include presentations with more diagrams, images and less text, and who discuss the subject content. All participants disliked formal lectures. They also expressed that they do not like it when lecturers use presentations improperly. David stated that:

I hate it when lecturers just read from the PowerPoint presentation and won't be explaining a thing! I cannot stand it. And then to make matters worse, the voice is a monotone.

Hubert's comment was similar to David's. He finds lecturers reading directly from a book useless. Other methods considered effective were tutorials, student presentations, and tasks given to be worked at home. Ian mentioned that his best effective teaching and learning experience is when he constantly explains and answers students' challenging questions.

Participants were also asked to mention which method they wish to see in every lecture they attend. They all agreed that there is no particular method which they prefer, as long as the lecturer interacts with the students and a discussion is constantly maintained. Equally important, David mentioned that he prefers field work, since it gives him insight on what really involves together with apprenticeship.

They were also invited to comment about a vocational lecturer's good qualities. Most of them mentioned a lecturer having industrial experience, and who can relate the contents of the curriculum with what happens in industry. However, this seemed to be a priority mainly with final year students. First years commented that lecturers should be open and approachable. It was also mentioned that lecturers should be charismatic and show enthusiasm whilst lecturing. Jane, a first-year degree vocational student stated the following:

Lecturer has to be alert and know exactly the state in which students are in during the lesson. They need to know the subject well and adapt teaching to each and every student that is present. .and not to blunt!! It's natural to have preferences but please, don't show it to the students! They should show respect and always be willing to help students.

Final-year students also mentioned that they would want the lecturer to include authentic tasks and provide challenging learning pathways; this would definitely help them in their place of work once they graduate. Other qualities mentioned between both groups was class control, engaging students in learning, being constructive and reflective, help

them in the formation of their vocational identity, and enhance personal growth.

Assessment/coursework preferences

Having discussed the characteristics of effective vocational teaching-learning, and the qualities of a good lecturer, the participants were invited to comment about their preferred assessment styles. A common answer was assessed home based assignments. All participants agreed that when a subject involves in-depth learning, they prefer to research about a particular topic and be given an assignment about it. Likewise, they stated that exams were their second preference. However, all agreed that certain subjects which require calculation such as maths should be assessed as a time-constrained assignment under examination conditions. They mentioned that this will prevent students from copying. It was only Bernard who mentioned that he prefers oral exams if given the choice. Correspondingly, all agreed that exams which only require memory work without any challenging tasks should never be assessed. Ian, a final-year student, mentioned:

Why should we learn facts and be examined about those facts? There's the big book of facts which one can use! That's purely a waste of time and not examining our capabilities, but testing our memory which is not fair.

In addition, David explicitly said that he does not agree with the idea of exams. He commented:

Exams are important but you don't need an exam to pass. I agree with percentages. So for example 60% would be for an assignment, 20% for practical work and the last 20% for an exam. In that way, you will distinguish the outstanding students from the average students.

Gareth explained that the assessment style solely depends on the subject, and does not mind having exams. He mentioned that this might be so, as exams were almost widely used throughout his formal education years. Likewise, Edward mentioned that the assessment styles he encountered in his student life where the conventional marking scheme, which are exams.

After discussing various assessment styles participants were invited to comment about feedback from lecturers on an assigned task or assessment. All participants agreed that they would be eagerly waiting for feedback. All except Francis mentioned that the feedback style (whether written feedback or verbal feedback) does not make any difference so long as it is timely and fully given. On the other hand, Francis mentioned that he prefers written feedback, especially when it comes to corrections about certain engineering related problems.

Participants were also asked if their preferred assessment style is widely used with the institute they form part: all agreed that it mostly is.

RQ 2: What are the students' preferred learning environments?

The second research question aimed to identify the preferred learning environments via the use of images that participants provided during the interview. The images provided were organised into five domains of learning environments: 1) representation of group work, 2) representation of practical work, 3) representation of discussion, 4) outside class, and 5) representation of passion for subject content. The image representations of their preferred learning environment varied in style and type. Participants were asked to provide one image, though there were Edward and Ian who provided two images each. While reflecting upon and discussing the images, the importance of the participants own past personal and current experiences together with their beliefs about effective vocational teaching and learning became evident. Each domain is discussed and examples from the students' images are shared to depict the themes within each domain.

Representation of 'group work'

The images of this domain typically reflected the characteristics of effective teaching. Two thematic categories of information came across this data. The participants of the study focused on the personality characteristics of lecturers and to the methodologies used by lecturers. For example, Adrian prefers group work as an effective teaching-learning method. In fact, he said that he chose the image below (*Figure 1*) as it portrays the desks placed into groups of four. Furthermore, Adrian continued to explain that since gym balls are replacing the chairs, the environment enhances serenity, making the students feel relaxed and motivated.



Figure 1: Adrian's preferred learning environment

Bernard, Charles and David chose a similar image between them, although still unique. Their image was of a lecturer showing enthusiasm and interacting with the students during a lesson. Students also seemed to be participating happily and satisfied with the lecture.

Representation of 'practical work'

The images of this domain reflected the benefits of practical sessions. Three of the final-year students chose a similar image which was that of a site, particularly in an engine room (*Figure 2*). Edward, Francis and Gareth mentioned that site visits help them a lot and gives them the opportunity to practice what they do in class.



Figure 2: An example of an engine room

Representation of 'discussion'

Images within this domain reflect how learning can be achieved from discussion. Edward provided a second image depicting a semi-circular set up class as shown below:



Figure 3: Edward's second image of his preferred learning environment

He commented that a small class with that kind of setup enhances discussion. In addition, he mentioned that he would want to be in this type of class room setup when it comes to subjects that require a lot of calculations such as pure maths. He also stated the following:

I agree with a traditional class room. I don't agree with learning outside, because there are too many distractions. Even when I study, I want to be in a confined space on my own.

Moreover, Ian provided the below image:



Figure 4: Ian's preferred learning environment

For Ian, Raphael's 'The School of Athens' involves challenging discussion. His remarks were that the contemporary classroom setup is unfortunately too formal, and does not promote discussion. He expressed his frustration that sometimes education institutions move backwards instead of forward. He continued to explain that education tends to focus on either scientific or artistic disciplines. He stated that:

Art inspires creativity. So why do we eliminate art from our scientific learning. We speak about innovation all the time, yet we do not teach the tools that would help when it comes to creating an innovative idea. The learning system has become too bureaucratic.

We have forgotten that learning is a lifelong experience that is essential for improving our society and not for individual gain. I dare say that schools and universities from my personal experience are just one big power grab! Where the student and the teachers are treated like the lowest life forms.

Outside class

Images for this domain were the fewest in number as it was only Hubert that chose such a preferred learning environment. The image he provided is the following:



Figure 5: Hubert's preferred learning environment

He commented that he will only learn in a relaxing environment and prefers change. Indeed, he would prefer learning outside the class in a completely new place, which would motivate him more.

Representation of passion for subject content

Similar to the fourth domain, it was only Jane who provided a diagram. Here, discipline was the main emphasis rather than the lecturer. This is depicted in Image 6 below: Jane discussed that she chose that diagram since it shows the exact flow of how one should learn, which in her opinion, is the best way to learn, irrelevant of any particular teaching methods or good qualities in a lecturer.

7 Discussion

This study was designed to examine students' perceptions of effective vocational teaching in terms of lecturers' behaviour, knowledge and personality characteristics; students'



Figure 6: Jane's preferred learning environment

needs and expectations; and assessment preferences. In addition, the second purpose was to investigate students' preferred learning environments.

Regarding the first research question, the findings indicated a difference between first-year and final-year degree students' perceptions of effective teaching and learning. The findings revealed a difference mainly in the qualities of a good lecturer. Final-year degree students gave importance to lecturers having industrial experience, whereas first-year degree students expected approachable and charismatic lecturers. Earlier research on personality characteristics also showed this (e.g. Sikorski et al., 2002; Adamson et al., 2005; Faranda & Clarke, 2004). However, all participants expect lectures to be student-centred and interactive.

Most participants were disappointed in their learning experiences. They stated that some lecturers emphasize more on theory than practice. All vocational students believe that both theory and practice are important. This study's particular results are consistent with previous research on quality teaching within the higher education context (Ustunluoglu, 2017). In addition, Muddiman and Frymier (2009) stated that learning is enhanced when lecturers promote a lively discussion while teaching and relating practice to theory. On the other hand, positive learning experiences that participants commented about were when group work and visual learning are involved. Participants appreciate the fact that the use of visuals are incorporated in their PowerPoint presentations, as they can automatically visualise and relate to what they will find in industry. However, both groups raised their concern about the use of PowerPoint presentations during lectures. They claimed that some of the lecturers do not use them in the most useful way, and lectures end up being too formal and monotonous. Furthermore, all participants do not have a preference with regard to the teaching method, so long as a discussion with the lecturer is maintained throughout.

Participants were concerned with the assessment style. They claimed that every subject should be assessed respectively. All students agreed that they prefer home based assignments. Most also agreed with having split percentages to assess a particular topic. The assessment style would be split up between coursework, practical session and exam. These findings are in line with the studies of Zoller and Ben-Chaim (1988), where students prefer assessments that reduce stress and are easy to take.

Pertaining feedback, participants explained that it is essential and beneficial to them. They explained that feedback style does not make any difference to them, so long as it is given to them especially on time. These findings are in line with the results of Chickering and Gamson (1987), where prompt feedback is listed as one of the seven principles for good practice with higher education. Similarly, participants agreed that their voice should be heard to enhance their learning experience.

With regard to the second research question, students' preferred learning environments are in line with most characteristics of the PLE framework. Images with the first domain (representation of group work) reflected the characteristics of the first feature of the theoretical framework used in this study. One can notice that the images represent learning programmes are designed in a manner where theory and practice are related to each other. Students expressed their desires to solve authentic tasks with each other's help. This is also in line with the second domain (practical work) of the photo-elicitation interviews. The students' images also depict their want of explorative and reflective learning, the third feature of the PLE framework. Indeed, classroom environments where a discussion can be maintained were chosen as a preference. These findings are in line with the study of Placklé et al., (2014).

8 Conclusions, Limitations and Future Work

In an ideal learning environment both students and educators work hand in hand to experience exceptional teaching and learning. Higher vocational students have their own preferences, and giving them a voice and seeing through their eyes is the first step for enhancement to take place. Findings from this study raise important points for consideration within the higher vocational education context. The findings presented indicate that students should be allowed to voice their opinions and their evaluations should be considered. Likewise, lecturers teaching within the higher vocational education context should also voice their opinion and identify their expectations of their lectures too. This will help both lecturers and students become aware of these expectations and preferences, and relevant professional development should be offered to these lecturers to enhance the teaching experience. This study is of interest as it provides a clear idea of what higher vocational students are satisfied with lecturers' abilities, and those in which they are less pleased with. From the evidence of the participants of this study, it can be concluded that there is no particular difference between a higher vocational student and a higher education student. This is so since the characteristics that were mentioned are very similar and consistent to previous research with higher education students (Ustunluoglu, 2017; Sander et al., 2000).

The participants also showed their preferences on the characteristics of powerful learning environments, which is the theoretical framework adopted for this study. In summary, they prefer to be the centre of teaching and learning and having authentic tasks organised for them. They also prefer being given opportunities to develop key competences, have teachers that are adaptive to support their learning, and work within a social practice in order to form their vocational identity. However, implementing PLEs can cause

tension and dilemmas on teachers. Teachers should be equipped to offer students their support. Having students in class with various preferences to various learning styles would be very difficult for the teacher to accommodate all at once. It is clear that there is inconsistency between the ideal scenario and what happens in practice. Hence, future work should include research on how teachers can cope with such challenges, how a consensus between various students' preferences can be reached and how vocational learning pathways can be redesigned to raise students' engagement and reduce dropouts. Furthermore, future research should also consist of an ideal framework to be considered when preparing authentic tasks, and how such tasks can be evaluated in order for learning to be meaningful.

Consideration of this collected data within this conceptual study could be used as a useful guide for designing and delivering bachelor's degree courses following a cohesive, vocationally oriented pedagogic-didactic approach, where a powerful learning environment is made available. However, the findings and their implications cannot be taken into consideration without highlighting the limitations and shortcomings of this research. These will be discussed next.

In this small scale study, the research design focussed on first year and final year higher vocational students from two different programmes only. Statistical or socio-economic data was not collected and analysed within this study. It would be insightful to include this data for further research. These participants from two different courses (Engineering and Applied Science) had different academic histories. There were students who joined the vocational college directly after compulsory education, and others who spent a year or two at university. These students who were at university had different advanced level profiles and also different academic backgrounds. Such differences affect the preferences and expectations of effective teaching and learning. Students who were at university might be more confident learning independently and as a result, having an unapproachable lecturer does not affect them. Therefore, such different academic backgrounds may warrant further investigation using the same methodology but also measuring student learning styles. Consequently, it would have been ideal to add to this conceptual study a collection of the details of the various previous experiences of different teaching and learning methods together with assessment styles these participants had. Such additional information would establish the extent of any differences between these participants, and whether there is a relationship between a preference or expectation for a particular teaching/learning method and awareness between them.

It would also be beneficial to conduct a longitudinal conceptual study starting from their first year up to their final year, and monitor changes in their attitudes towards effective vocational teaching and learning. The impact of these additional descriptions could also be considered when choosing professional development programmes for higher vocational lecturers.

When collecting such sensitive data, a range of students' expectations might be identified that for some reason or other might not be met due to various limitations regarding education resources or pedagogical matters. Such information is useful as certain unreasonable expectations will be catered for if planned ahead. Furthermore, such data collection could be an effective means of giving higher vocational students a voice when

constructing courses, and will guide course team discussions with regard to teaching, learning and assessment.

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Who is Going to Build the Wall? A Building Trades Crisis in the U.S.A.

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Abstract: The context of this study was to examine factors contributing to significant workforce shortages in building trades in the United States. As it is, recruitment of qualified skilled trades workers is becoming increasingly difficult due to lack of a pipeline of prospective workers, and training programs.

The study assumed a theoretical inquiry approach in order to address the following three main questions: 1) What is the scope of the workforce shortage in skilled and building trades in the US? 2) What factors are recognized as contributors to the building trades workforce shortage in the US? And, 3) What strategies can be implemented to reverse building trades workforce shortages in the US?

Findings affirmed that the scope of workforce shortages in skilled and building (construction) trades in the US is very broad and the impact is rather deep. Factors contributing to the shortage include: declines in high school technical education programs, which have been replaced by career academies; misconception that higher education always equal higher income, but the untold story is higher debt associated with pursuing higher education; and stricter immigration laws, which are forcing potential workers out of the US.

The study concluded that in order to reverse currently declining workforce trends the following six strategies should be implemented: 1) Make it a national priority, thereby appropriating adequate resources to the effort. 2) Increase the number of women and African Americans in building trades. 3) Expand apprenticeship programs. An expansion of both government and corporate incentives are needed to stimulate an increase in apprenticeships. 4) Reintroduce building and skilled trades programs in secondary and postsecondary schools. Growth in the number of Career Academies, and participation in them has been encouraging, yet there are not enough of them to meet the need. 5) Re-examine guest-worker programs, which are currently cumbersome for employers to

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participate in, and do not allow for anywhere close to the number of workers needed to meet workforce needs. 6) Change marketing of building trades from menial to meaningful. Many young people simply do not know that they can make a comfortable living from a career in skilled trades. They have been taught that at least a bachelor's degree is needed in order to have a successful career. This narrative has to be revised in order to create a pipeline of prospective skilled trades employees for the future.

Keywords: VET, Vocational Education and Training, Building, Career, Technical Vocational Education, Construction, Skilled Trades, Workforce Education

1 Introduction

During the 2016 election campaign in the U.S., there were resurgences of comments and controversies from notable politicians and their supporters about building a wall across the entire southern border between the United States and Mexico. Reasons given for desiring to once and for all separate the U.S. from its southern neighbor, were to stem the flow of illegal immigration, reduce the volume of illegal drugs coming into the U.S. from Mexico and South America, and reduce the threat of terrorism by closing a porous border. However, a major question that needed to be asked in this debate was, where will the workforce to build the wall come from?

While one of the strategies for addressing the building trades workforce shortage in the U.S. must include recruitment from among all demographic groups, recent estimates from the Bureau of Labor Statistics (2016) indicate that 28.9% of the construction workforce are Hispanic or Latino. These groups are also among those most often targeted and deported for working in the U.S. without legal documentation. This situation heightens the possibility that there will be fewer workers available to work on constructing the border wall, or any other building projects, thereby exacerbating the workforce crisis in the construction industry in the U.S.

In the past, early efforts to steer young people toward skilled trades use to begin in middle (5th or 6th grade to 8th grade) and high school (9th to 12th grade) in the US. Students encountered formal skilled trades training through vocational education (industrial arts) programs that were commonly referred to as “shop” programs. By the 1990s most of these programs were eliminated and replaced by Career Academies. This meant that Middle Schoolers began encountering formal skilled trades training at a much later stage in their academic journey, if at all. Kemple and Snipes (2000) provided the following description of Career Academies:

Career academies attempt to create more supportive and personalized learning environments through a school-within-a-school structure. Their curricula combine academic and occupation-related course requirements that aim both to promote applied learning and to satisfy college entrance requirements. Academies establish partnerships with local employers to build sequences of career awareness and work-based learning opportunities for their students (p. ES-1).

Career academies are generally characterized by three distinct features: Firstly, they are organized in cohorts of students (learning communities) who matriculate together for three to four years to provide a more supportive environment. Secondly, they combine academic and career and technical (vocational) curricula. Thirdly, they partner with local businesses and employers to provide career awareness and work-based opportunities so that students can acquire practical experience working in their proposed career field.

While career academies have proven to be highly successful in increasing engagement and performance, and reducing drop-out rates among students who participate in them, increases in enrollment numbers are needed before there can be sustained optimism, particularly about the future of building trades workforce in the U.S. The National Career Academy Coalition (2017) estimates that there are approximately 7,000 career academies in operation serving about one million students.

1.1 Purpose of Study

The purpose of this study is mainly to examine issues resulting in the current building trades workforce shortage in the U.S. and strategies that may be considered for reversing the shortage.

1.2 Research Questions

Literature review was based on the need to address the following questions:

1. What is the scope of the workforce shortage in skilled and building trades industries in the U.S.?
2. What factors are being recognized as contributors to the building trades workforce shortage in the U.S.?
3. What strategies can be implemented to reverse building trades workforce shortages in the U.S.?

2 Scope of the Workforce Shortage in Skilled and Building Trades

Nielsen (2016) stated that the term “skilled trades” includes various jobs that require training and contribute to the construction industry masons, bricklayers, electricians, plumbers, painters, carpenters, roofers, and heating and cooling (HVAC) workers. The terms “skilled trades” and “building trades” are often used interchangeably.

To emphasize the veracity of the growing workforce shortage in building trades, Renze-Rhodes (2016), reported estimates from the Manufacturing Institute, which is an affiliate of the National Association of Manufacturers, and which reports that today’s average age of a tradesperson is 56, and currently in the U.S. there are 600,000 skilled jobs, but by 2020, there will be a need for 10 million new skilled workers. Assuming this forecast holds true, the demand for skilled workers will grow significantly in the near

future. Additionally, Wright (2013) noted that skilled trades have far fewer 65-and-older workers than the total labor force (1.9% to 4.8%), which is a clear sign that skills trades jobs, being typically more physically demanding than other jobs, prevent workers from delaying retirement because they need the money or because they simply enjoy working. The fact is, many skilled trades workers come to a hard stop in their careers due to the physical demands of the job. Schwartz (2015) observed that for six consecutive years, skilled trade vacancies were the hardest to fill in the U.S., and for four consecutive years were the hardest to fill globally.

Signs of a crisis in the construction workforce was evident before the 2007 recession started. Gibbs (2005) echoed this sentiment by stating that America is facing a skilled labor shortage in the construction industry. However, Elejalde-Ruiz (2016) wrote that the construction workforce, which thinned out dramatically as work dried up during the economic downturn, is only three-quarters what it was pre-recession. Beyer (2017) quoted an economist for the National Association of Homebuilders (NAHB), who stated that the share of builders reporting either some or serious worker shortages has skyrocketed from 21 percent in 2012, to 46 percent in 2014, 52 percent in 2015, and 56 percent in 2016. These numbers obviously give reason for concern in light of the economic upturn in the Stock Market, which usually precipitates a boom in new construction.

Schwatka, Butler, and Rosecrance (2012) predicted that the number of jobs in the construction industry will continue to grow by 19% from 2008 to 2018, compared with a projected 11% for all other industries combined. These authors also projected that growth of the construction industry will be hindered in the future by a shortage of skilled workers. Thus, keeping skilled workers employed in the industry is a high priority in the U.S.

Based on these findings, it seems evident that the scope of workforce shortages in skilled and building (construction) trades is very broad and the impact is rather deep.

3 Factors Recognized as Contributors to the Workforce Shortage

There may be a number of contributing factors to the building trades workforce shortage; However, the following three main contributors will be presented: 1) Decline in high school Technical Education Programs; 2) Misconception that higher education always equals higher income; and 3) Stricter immigration laws.

Decline in high school technical education programs

Krupnick (2017) reported that many fields are facing worker shortages because so much effort has been put into encouraging high school graduates to go to college for academic degrees rather than for training in industrial and other trades. Drew-Thompson (2014) postulated that the shortage in skilled trades and construction workforce began with the steady stripping away of technical education programs from public schools in the way our society, namely parents and educators, perceive how career paths are best determined.

For the past two decades there has been persistent declines in the number of technical

education programs offered in high schools. As mentioned earlier, many of these programs are now offered through Career Academies, but many high schools do not have, nor are they associated with, a Career Academy. Hudson (2013) wrote in a National Center for Education Statics (NCES) report that the average number of secondary/ high school courses taken in career and technical education declined from approximately 4.2 credits in 1990 to 3.6 credits in 2009, while the average number of credits earned in other subject areas increased.

Traditionally, students who developed an interest in career and technical education (CTE) fields such as building and construction trades went to work immediately following high school. However, Oymak (2017) found that 74% of ninth graders in 2009 expected their main activity in 2013 to be postsecondary education. Only 19% expected their main activity to be work. Oymak's report also found that students' expectation for postsecondary education increased as family socioeconomic status (SES) increased. This information seems to confirm that there is a diminished view in society today when it comes to the value of traditional blue-collar jobs.

Misconception that higher education always equals higher income

Many students shy away from pursuing skilled trades careers because of the misconception that higher educational achievement always equals higher income levels. Carlson and McChesney (2015) found that the higher the educational achievement, the higher the associated average salary. However, Hamm (2016) noted that such studies often do not paint the whole picture. Hamm argued that there is not much of a drop-off in salaries between trade school graduates (\$35,720) and those with a four-year degree (\$46,900), when the fact that trade school only takes an average of two years to complete versus four, and in many cases more than four years for a bachelor's degree. It puts the trade school graduate ahead by approximately \$71,440. Additionally, Hamm found that some youth may shy away from skilled trades because of parental, school, and even peer stigma, which associates skilled trades with lack of an ability to succeed in traditional academic areas of study.

Weller (2017) reported results from a review of U.S. Census data, which showed the top eleven college programs with the highest unemployment rates. Table 1 ranks each program in order by unemployment rate. Notably, none of the programs are in the skilled trades:

There are also disparities between salary levels for those with bachelor's degrees depending on field of study. In other words, all bachelor's degrees are not the same in terms of salaries and job prospects. Furthermore, Bondar (2016) cautioned that while most colleges try to create strong job-placement programs, if you are majoring in a subject outside of science, technology, engineering, math (STEM), or business field, schools are less equipped to help you find a job after graduation. On the other hand, vocational (trade) schools pride themselves on having strong partnerships with industries their graduates work in.

Table 1: Eleven college majors with the highest unemployment rates

No	Program (major)	Unemployment rate
1	Composition & rhetoric	17.54%
2	Environmental science	11.79%
3	Anthropology & archaeology	11.76%
4	Drama & theater arts	11.42%
5	Film, video, & photographic arts	11.24%
6	Mass media	10.92%
7	Fine arts	10.90%
8	Ethnic & civilization studies	10.84%
9	Intercultural & international studies	9.93%
10	Communications technologies	9.40%
11	Biology	8.76%

Another prohibitive factor worth mentioning is huge loans students are usually stuck with for years after completing a bachelor's degree. While Anderson (2017) agreed that learning a skill, such as welding, auto mechanics, or construction can lead to a lucrative career, a college degree has many benefits too. Therefore, a summary of research seems to suggest that a combination of skilled trade proficiency along with postsecondary educational attainment may be the best educational preparedness.

Stricter immigration laws

Conrad (2016), attributed the main causes for the workforce shortage to: a slow-down (67% decrease from 2006-2013) in immigration to the U.S. over the past decade, foreign workers who have not returned to the U.S. after the housing crisis, and increases in opportunities in Mexico, along with increases in immigration enforcement along the border, which prevents workers from returning. While these immigration-related factors may be contributors to the workforce shortage, immigration also happens to be the one factor that seems to garner more political and legislative banter than any other. Nevertheless, because workforce shortages are so severe, a fresh look at immigration is more than likely the only viable short and long-term solution to the problem.

Table 2 below, which was adapted from a U.S. Bureau of Labor Statistics (2016) report, shows how various groups are represented in the building and extraction trades in the U.S. It indicates that in every category, Hispanic and Latino workers comprise a major portion of the U.S. workforce in these occupations. This means that changes in immigration policies, which are expected to significantly impact Hispanic and Latino populations, will also impact the workforce in industries where many of them are employed.

Table 2: Employed Persons by Occupation, Sex, Race, Hispanic or Latino Ethnicity. Source: U.S. Census Bureau 2016

Occupation	Total	Percentage of Total Employed				
		Women	Black/African	Asian	Hispanic/Latino	
Construction & extraction (total)	7,929,000	3,0	6,8	1,7	34	
First line supervisors	680,000	2,6	5,5	1,5	22,5	
Brick, block, stone masons	160,000	0,5	6,4	0,5	45,5	
Carpenters	1,359,000	2,1	5,4	1,2	33,9	
Carpet, floor, tile installers	168,000	1,9	3,5	0,9	50,8	
Cement masons, concrete finishers	56,000	2,2	10,5	1,6	48,8	
Construction laborers	1,801,000	3,5	8,1	2,2	45,5	
Operating engineers	351,000	2,3	8,7	0,2	19,3	
Drywall & ceiling tile installers	180,000	1,1	6,7	0,5	62,7	
Electricians	774,000	3	5,9	3,1	16,8	
Painters, construction & Maint.	612,000	6,2	5,7	3,6	50,7	
Pipelayers, plumbers, pipefitters	583,000	1,4	7,5	0,9	21,2	
Roofers	230,000	1,7	4,9	1,1	51,7	
Sheet metal workers	126,000	2,9	6,7	2,1	16,7	
Construction & building inspectors	93,000	6,4	11,8	2,4	9,9	
Highway maintenance workers	92,000	3,2	9,6	0,2	15,1	

4 Strategies for Reversing Building Trades Workforce Shortages

Make it a national priority

Enactment of the Carl D. Perkins Bill, which provides federal funding for career and technical education (CTE) programs in the U.S. first occurred in 1984. Since then, there have been a couple of re-authorizations in 1998 and 2006. The Bill is currently up for another re-authorization and so far has gained enough by-partisan support to allow it to pass in the U.S. House of Representatives in 2017. Full re-authorization will once again affirm the U.S. government's strongest support for career and technical education. Following passage of the bill in the House, Nagurka (2017) stated that the work on Perkins will now be focused in the Senate, and he expressed hope that the Senate will make Perkins reauthorization a priority in the coming months. Staklis and Klein (2014) mentioned that the Carl D. Perkins Act sets a minimum allocation requirement that secondary and postsecondary CTE sub-grantees must achieve to receive federal financing. Such minimum requirements and the financial support grantees receive can go a long way in keeping CTE programs viable and in motivating educational institutions to offer them.

Increase the Number of Women and African Americans in Building Trades Careers

From a historical perspective, Wyatt and Hecker (2006) found that construction workers declined 31 percent as a proportion of total employment between 1910 and 2000, from 4.3 percent to 3.0 percent. Most of this decline was among carpenters. Carson (2011) stated that during the early history of the U.S., construction jobs were among the only employment Black men could get, and so a significant number of them worked in construction trades. However, the BLS chart above (table 2) provides substantial evidence of the current level of under-representation among women and African American men in building trades fields. Efforts to reverse the workforce shortage must include recruitment among these groups.

Additionally, reauthorization of the Workforce Investment Act (WIA), which was initially passed in 1998, or similar legislation, might be helpful. Best and Cohen (2013) indicated that WIA, which funds workforce education, career pathways programs, and other programs typically aimed at assisting low-income and other vulnerable groups, has not been reauthorized since its passage.

Expansion of apprenticeships

Finkel (2016) reiterated the fact that partnerships between community colleges and employers to create apprenticeships have been around for decades. These traditionally have covered fields like the building trades electrical, construction, and others as well as heavy manufacturing like the automobile industry. Continued support for these types of apprenticeships is sorely needed. Helper, Noonan, Nicholson and Langdon (2016), lauded the benefits of apprenticeships by asserting that the payoffs for workers is clear: 91 percent of apprentices find employment after completing their program, and their average starting wage is above \$60,000. As a result, the U.S. Department of Labor has

invested \$265 million since 2015 to expand apprenticeships. Helper et al. also examined benefits to businesses which engage in apprenticeship programs. They reported that all of the firms they studied believe that apprenticeships improved their overall performance and provide a competitive advantage over other firms in three distinct areas: production, workforce (less turnover), and soft skills.

Re-introduce building and skilled trades programs

Apart from career academies, a number of skilled trades programs, which were once taught in secondary schools, if they are still offered are offered through dual enrollment with a community or Junior college. Students can receive sub-baccalaureate credentials (certificates, associates degrees) through these arrangements (Chen & Schmidtke, 2017). The number of students who can be credentialed through the dual enrollment plan is directly impacted by the availability of institutions to engage in such arrangements. Hudson (2017) found that the number of occupational education institutions in the U.S. declined between 2000 and 2014. The following chart summarizes the decline:

Table 3: Postsecondary Institutions Offering Sub-Baccalaureate Occupational Education Programs

Type of Institution	Institutions in 2000	Institutions in 2014	Percentage Change
Public	35	29	17%
Private, non profit	18	14	22%

Occupational education is similar to career and technical education in that it is designed to prepare students for careers following their occupational training. A decline in institutions offering occupational education training undoubtedly impacts the supply of potential workers in building and skilled trades. Additionally, Roberts (2016) established that students who matriculate in sub-baccalaureate programs in occupational fields are less likely to persist to attaining a credential than those who matriculate in other fields. Therefore, institutions that offer occupational education curricula should also have strong student retention programs.

Re-examine guest-worker programs

Workforce shortages in building and construction trades in the U.S. have been so prolonged and increasingly intense that the problem appear unsolvable by a supply of workers who are either citizens or permanent residents of the U.S. Prospects seem more bleak now than they did in the past ten years. Political efforts to address the situation appear meager in light of the enormity of the problem. For example, Greenhouse (2013) reported that an immigration deal crafted in the U.S. Congress capped the number of guest construction workers admitted to the U.S. each year at 15,000, and in a bow to labor unions, bars admission for any higher-skilled workers like electricians, crane opera-

tors or elevator repair technicians. Several major construction industry groups criticized the agreement, claiming that the number of visas allowed is too low.

Guest-worker programs allow workers from foreign countries to legally work in the U.S. particularly in high-demand areas where there is a shortage of U.S. workers. The type of visa issued is called an H-2B visa, which is available to skilled or unskilled construction workers. In describing the requirements for employers to acquire guest workers, Slowey (2016) stated that the open position(s) must be of a one-time or seasonal nature, which excludes any work available year-round. Employers must show that there are no American workers able and willing to do the work, and they must cover all travel and visa expenses the guest worker might incur. These and other regulations make this option somewhat prohibitive for employers in the construction industry. Reform is needed to make guest worker programs friendlier and easier for employers to pursue with the appropriate government anti-abuse oversight.

Change marketing from menial to meaningful

A movement is needed to reeducate society, particularly parents and educators about what a good job looks like. Krupnick (2017) reported that the State of California is spending \$6 million on a campaign to revive the reputation of vocational education, and \$200 million to improve the delivery of it. The author noted that some view this as a “cultural rebuild.” In reflecting on a message given by Senator Marco Rubio, R-Florida, during the 2016 presidential campaign, Krupnick echoed Rubio’s statement that “welders make more money than philosophers.”

Wright (2013) reported concerns that for two or three generations, the focus of education has been to go to college, get a degree and in doing so ensure a brighter future with more access to employment. The issue at hand is, the focus on academic instruction resulted in neglect of career education. Wright noted that in a two-year institution, costs are less, and the average student can finish with skills to gain immediate employment. Academic and career education do not have to be competing choices as they can complement each other. Most importantly, Wright concluded that skilled trades can provide a promising career path depending on a job seeker’s skills and location. Somehow, this message has been lost, but it needs to be communicated again in order to reverse declining workforce shortages in skilled and building trades.

5 Conclusion

The desire to build a wall on the southern border between the U.S. and Mexico will likely bring greater attention to the building trades workforce shortage, which has grown to crisis levels. Since employers are finding it difficult to find workers for construction projects across the U.S. it should be expected that there will also be worker shortages to build the border wall. It should be expected that if the wall is to be built, a disproportionate number of workers on that project will reflect the way it is on projects across the country, namely, many of the workers will be immigrants. And, if immigrant workers are not available the wall will either take longer to build, or may not be built at all.

There are no viable short-term options to addressing the skilled and building trades workforce shortage in the U.S. other than to through immigration and guest worker programs. Other options, such as promoting skilled trades in secondary and postsecondary institutions will not yield the number of workers needed to immediately address the shortage, and will take longer than can be afforded.

Admittedly, the social stigma associated with being a construction worker may not equal what it is in some other positions, which require traditional academic training, but that stigma needs to change because in many cases, skilled trades jobs pay as good, or better. The ability to earn a decent living by working in skilled trade should be communicated to young people who are often herded into academic disciplines, thinking that to be their only path to a successful life; only to find it difficult later due to high debt incurred trying to acquire the requisite academic training.

To reverse the workforce crisis, which is looking as if it will become worse in the years ahead, a multifaceted approach must be taken. It will require financial support from government and private stakeholders, favorable immigration legislation, reintroduction of skilled trades programs in secondary and postsecondary schools, increased participation in career academies, recruitment of workers from all demographic segments of the population, and rebranding the status of skilled and building trades professions in the U.S. as occupations that are as equally important and rewarding as any other.

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Book Review: Internationalization in Vocational Education and Training

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Book Review

Internationalization in Vocational Education and Training: Transnational Perspectives, edited by Ly Thi Tran and Kate Dempsey, Springer, Cham/Switzerland, 2017, 255 pp., ISBN 978-3-319-47857-9 (hardback) about 90 €, ISBN 978-3-319-47859-3 (eBook), about 70 €.

The book was published in the series *Technical and Vocational Education and Training: Issues, Concerns and Prospects*. Series Editor-in-Chief is Rupert MacLean. Editors of the volume are **Ly Thi Tran**, associate professor in the Faculty of Arts and Education of Deakin University in Australia), and **Kate Dempsey**, independent education consultant from Melbourne in Australia.

Scope and Context

The book consists of 14 articles written by 24 authors. The studies cover 12 countries Australia, China, European Union, Korea, Kuwait, Laos, Netherlands, United Kingdom, United States, and Vietnam - and give insights into different institutional contexts. The aim of the book is to highlight the current phase of internationalization in the field of vocational education and training (VET) and how it is reflected in VET-related research.

The chapters are grouped in four parts that are presented as thematic blocks. **The first part** explores the changes that have occurred in the development of VET due to globalization and neo-liberal market policies. **The second part** analyzes processes

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of importing/exporting VET systems or practices and discusses the consequences for national VET reforms. **The third part** examines crossing the boundaries in the context of VET with exemplary studies that draw attention to internationalization, mobility and the language skills as challenges in vocational learning. **The fourth part** includes the concluding chapter in which the editors present their conclusions highlighting the key issues raised in the book. (*Below we will focus on the three first thematic blocks and then present our concluding remarks.*)

Whilst the book has been structured into the above-mentioned thematic blocks, there are also several transversal layers that bring different aspects of international VET research together. Altogether the chapters provide an overview of systemic structures, but at the same time give insights into the realm of local actors (e.g. VET managers, teachers etc.) and into the learners' points of view.

Internationalization and its Impact on VET

In the first contribution to this part has been written by **John S. Levin, Ariadna I. López-Damián, Marie C. Martin, and Michael J. Hoggatt**. They highlight the impact that the free market ideology has had on policies practices of the US Community Colleges of three American states (Hawaii, California, Washington). For this purpose, the authors set forth a longitudinal study, which compared two periods of time (1989-1999 and 2000-2013) through discourse analysis on state policy documents and narrative analysis of interviews with US Community Colleges' administrators and teachers.

Subsequently, the next chapter examines the effects of the commercialisation of Australian VET sector and international students mobility, caused by the neoliberal educational policy reforms, on private VET providers. Through a social perspective, the author **Rinos Pasura** discusses the importance of these changes, such as the increasing number of full-paying international students. The chapter describes, how local actors have perceived such changes and what kind of impact they have had on work practices. These analyzes were based on in-depth interviews with VET schools' managers and quality assurance experts.

In the following chapter **Kathrin Kaleja** and **Regina Egetenmeyer** propose a well-structured synthesis of European policies for internationalization and mobility in VET. They explain, why the European Union (EU) is promoting internationalization, by referring to both social and economic points of view. They give insights into the development of credit transfer systems and into EU-funded projects for promoting mobility across Europe. Moreover, they highlight the critical points that slow down the internationalisation process in the field of VET.

The subsequent chapter studies the training needs of Australian VET teachers who have experiences pedagogical challenges when teaching international students. **Ly Thi Tran** and **Truc Thi Thanh Le** analyzed empirical data based on 30 interviews with teachers and staff involved in VET teacher training. They identified three possible areas of improvement regarding better responsiveness to the needs for pedagogic support when working with international students. Their approach also allowed them to link their

findings to a framework dealing with the internationalization of VET.

In the last contribution to the first part **Roy Fisher** and **Mike Saunders** provide an overview of the UK government policies for internationalization of VET. They highlight contradictions between the declared aims to increase the enrollment of international students and yet maintaining restrictive policies for giving visas. The article also presents a brief overview of good practices gathered from Further Education Colleges.

VET Transfer and Appropriation

The first chapter of the second thematic block presents three case studies. **Mark Rahimi** and **Helen Smith** explore the effects caused by importing of Australian VET regulations and management systems into three different national contexts - Laos, Middle East and China. All of these receiving countries have had very different educational regulation from the Australian one. Through the analysis of the mechanisms, strategies and tools used to adapt the Australian VET practices to the new contexts, three models of transitional VET and six dimensions of transitional activities have been identified.

Following a similar approach, **Anne Reich** and **Tien Thi Hanh Ho** provide an overview of the current situation in the Vietnamese educational system. It summarises the main historical events that have influenced its development. Furthermore, it outlines the current government policies for the internationalisation of VET as means to upgrade the skills of the workforce. The analysis draws attention to the efforts of the Vietnamese institutions to adapt the imported Western models to their cultural background.

In the next chapter **Kate Dempsey** and **Xia Tao** present several good examples of cooperation and improvements based on mutual exchanges. This contribution shows how an Australian association of VET providers (the TAFE institutes) implements the Australian qualification system in China adapting it to local Chinese needs. These were not always taken into account by the Australian quality assurance approach. The authors also shared information on the main co-operation arrangements between Chinese vocational education institutes and their foreign counterparts.

The last two chapters of this part focus on Korean efforts to develop a VET system that is adjusted to the skills needs on the labor market as well as to the national educational culture. **Mihae Mary Nahm** describes the evolution of the Korean VET system. It has changed from a closed option within the upper secondary education to become an alternative career path to university education. According to the authors of the other article, **Antje Barabasch**, **Stefanie Petrick**, and **Cheonsoo Park**, the Korean governments have been examining foreign VET Systems, e.g. the German and the Swiss ones. In particular, there has been an interest to improve the vocational training programs with features of apprentice training. At the same time Korean experts have been supporting developing countries and sharing their examples of best practices in VET.

Extending the VET Boundaries

The third part consists of two chapters. **Hilde Bastiaannet** focuses primarily on the internationalization in the Dutch upper secondary education. Her study is mainly based on analyses of national and international literature. She gives firstly an overview on policies and practices related to the upper secondary education context. Then she complements the national picture with an overview of the European policies starting from the Lifelong Learning Programme and continuing with the European framework processes (EQF, ECVET, RPL, Europass, EQAVET etc.). With this extension she draws brings forward the tensions between internationalization and mobility vs. the national jurisdiction, institutional settings and different cultural interpretations of similar concepts.

The second chapter of this part discusses lingual problems as a critical issue for internationalization process. **Linda Serra Hagedorn** and **Ran Li** acknowledge the fact that English is the vehicular language for internationalization processes. In their empirical analyses they report on their findings based on a sample of international community college students in the USA. Here they draw attention to the students' views on the need to develop their English language skills from the perspective of improving their career prospects.

Concluding Remarks

All in all, the book tries to provide us a colorful picture of the state of the art in research on internationalization in VET. The authors have faced manifold challenges, but they been able to outline a framework that serves as a reference point for further research in this area. The descriptions of national VET systems and the analyses of national policies and practices provide already a valuable source of information. Here, it is of importance that the chapters discuss internationalization in VET as a process with many tensions between the driving forces and the cultural backgrounds.

In many chapters the authors shift the emphasis from the macro level to the micro level and vice versa. In this way they draw attention to different roles of the actors involved and to the influence they have on the processes that have been studied. This change of perspectives is also reflected in the research methodologies that have been used. The authors have moved from desk research on governmental policies to qualitative analyses of practitioners' perspectives and cross-cultural discourse analyses.

The chapters present a heterogeneous panorama of topics that are relevant for the research field. In this respect the concluding chapter is essential as it seeks to keep a red thread visible through the variety of chapters brought together. Moreover, book gives insights into *emerging issues* and to *new challenges* that need to be considered in the context of developing VET. Therefore, this book can be considered as an important milestone in the conceptual interpretation of processes contributing to *internationalization in VET*. Moreover, it is worthwhile to emphasize that the book is not only relevant for VET researchers, but it is also interesting to those who are engaged in the development

of international cooperation and exchanges between different educational cultures and VET systems.

Biographical Notes

Marco Perini, PhD student, enrolled in the third year of the PhD program in the Human Sciences at Department of Human Sciences, University of Verona. His main area of interest and research include Vocational Education and Training, educational technologies, work based learning and teacher education. Prior to enrolling at University of Verona he worked for four years as freelance Moodle and IT teacher in VET centers and schools. He also worked as training manager and tutor in several projects funded by the European Union.

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The Prediction of Professional Success in Apprenticeship: The Role of Cognitive and Non-Cognitive Abilities, of Interests and Personality

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Abstract

Context: We addressed the issue of person-job-fit by focussing on both professional success and work satisfaction. Publications studying the predictive validity of (cognitive) ability, personality, or vocational interest alone have shown relationships with professional success or work satisfaction for each predictor separately. Nevertheless, these predictors have rarely been studied simultaneously.

Methods: To this end we tested the incremental validity of abilities, traits, and interests in a sample from diverse occupations: In 648 apprentices and students from five different branches (Food, Tech, People, Office, Craft) the (incremental) contributions of 3 intelligence factors (verbal, numerical, spatial), 3 alternative abilities (social-emotional, creative, practical), 4 conscientiousness facets, other big five factors (O, E, A, N), and of 14 professional interests were analysed regarding prediction of GPA in professional schools and school/job satisfaction.

Results: Intelligence and conscientiousness were best predictors, followed by social-emotional competence and interests, whereas other traits provided marginal contributions. Predictors varied between branches, mostly following expectations. The test battery allowed a very good prediction of apprenticeship success (max. 37%), but for some branches prediction was considerably lower.

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Conclusion: Criteria for person-job-fit are not swappable, neither are the predictors. Professional success was mostly predicted by a different predictor set—namely ability and the personality dimension of conscientiousness—then satisfaction, which was mostly predicted by non-interest in a certain occupation. As a practical implication, we conclude that choosing the right candidate for a certain branch one needs to use a broad set of predictor variables. Besides cognitive ability also personality and vocational interests had predictive validity for an individuals person-job-fit.

Keywords: VET, Vocational Education and Training, Apprentice, Career Guidance, Job Satisfaction, Secondary School, Vocational School, Personality, Vocational Interest

1 Introduction

When individuals reflect whether their chosen profession were right for them they most likely ask themselves two questions: “Am I good at this?” and “am I happy with this?” Researchers interested in vocational education and training on the other hand reflect which variables of the individual makes her or him both “good at it”—professional success—and “happy with it”—work satisfaction. The three broad individual difference domains of (cognitive) ability, personality, and vocational interests are highly likely candidates for impacting professional success and work satisfaction (Sackett, Lievens, Van Iddeking, & Kuncel, 2017). But what are these domains incremental influence over and above each other in the prediction of professional success and work satisfaction.

The following introduction will first review which contribution to the prediction of professional success and work satisfaction each domain of individual differences—general cognitive abilities, personality, and vocational interests—can make. Next the intercorrelations of these domains are outlined. Finally, we will overview studies which have used these domains congruently and thus provide insides into the incremental validity of each.

1.1 Predictive Validity of Abilities, Personality, and Vocational Interests Individually

For intelligence or general cognitive ability (GCA) typically the highest correlations with professional success can be found, with r 's around .50 and higher (Gottfredson, 1997; Schmidt & Hunter, 1998, 2004; Strenze, 2007; Kramer, 2009; Salgado, Anderson, Moscoso, Bertua, De Fruyt & Rolland, 2003; Kuncel, Hezlett, & Ones, 2004). And the relationship does not decrease with duration or professional expertise on the job (Hambrick & Meinz, 2011; Schmidt & Hunter, 2004), thus contradicting the criticism that with increasing job experience GCA should become less and less relevant. Another frequently proposed criticism, namely that socio-economic status (SES) is more relevant than intelligence and controlling for it should substantially reduce any GCA*success relationship, has been discredited for two of three success indicators in the meta-analysis by Strenze (2007); solely for predicting the criterion of income SES had a somewhat higher correlation than GCA.

The predictive power for professional success has been studied meta-analytically also

for classical personality traits, mostly following the Five Factor Model (FFM, Costa, & McCrae, 1992). In a meta-analysis Barrick, Mount and Judge (2001) have found the trait conscientiousness to be the most valid and most universal predictor of professional success; this trait plays an important role for almost all (analyzed) professions, although r 's between .21 and .33 are lower than for GCA. The other big five traits are not as universally predictive, they correlate with success only in some of the analysed professions and for the whole sample they give mean r 's between .07 and .15 only. Furthermore, motivation as assessed by general self-efficacy plays a vital role in the prediction of professional success (Abele & Spurk, 2009; Abele, Stief, & Andrä, 2000; Judge & Bono, 2001).

For the predictive power of (professional) interests regarding job success two rather recent meta-analyses are available: Van Iddekinge, Putka and Campbell (2011) showed that (mostly Holland's RIASEC) interest scales are good at predicting training performance (.26), and less so, but still they are valid for intended and actual turnover (.19 and .15), whereas the prediction of job performance was lowest (.14). These results hold for single interest scales that come mostly from the general RIASEC model, but prediction can be improved through the use of special scales designed to measure interests for particular jobs. In addition, generally somewhat higher validities are found for regression-based composites (up to .37). The latter finding demonstrates that multiple scales produce higher validities than single scales. Another meta-analysis on this question (Nye, Su, Rounds, & Drasgow, 2012) complements these results by reporting that correlations between congruence indices and professional criteria are higher (.21 to .30) than for interest scores alone (.05 to .14, for task performance; the other analysed criteria gave mostly similar findings).

1.2 Intercorrelations of Abilities, Personality, and Vocational Interests

The validity generalizations reported so far, however, provide no information about overall prediction of professional/job success and related criteria, and of incremental validities of one group of predictors over the other(s). The issue of incremental validities depends mostly on the intercorrelations of these predictor groups. These are usually rather low: Abilities correlate rather low with interests; mostly between .10 and .20, in few cases up to .30 (Ackerman & Heggstad, 1997; Pässler, Beinicke, & Hell, 2015; Proyer, 2006). Cognitive abilities are mostly not correlated (r 's $<$.10) with big five traits; with only two exceptions: Furnham, Moutafi and Chamorro-Premuzic (2005) found openness correlated at .21 with fluid intelligence, and Ackerman and Heggstad, 1997 observed a negative correlation (-.15) of intelligence with Neuroticism.

Relatively the highest but few correlations can be found between big five personality traits and RIASEC interests: An older meta-analysis by Barrick, Mount and Gupta (2003) shows that extraversion and Enterprising correlate at .41, openness with Artistic and Investigative at $r = .39$ and .25, respectively; all other relations were below .20. When regressing each RIASEC type on FFM scores partially high R 's (.47 for Enterprising and .42 for Artistic) as well as medium sized R 's can be found (between .27 and .31 for Social, Conventional and Investigative). Realistic interest gave the lowest R of

.11. Short time later, another meta-analysis by Mount, Barrick, Scullen and Rounds (2005) showed that out of the 30 correlations (5 FFM variables * 6 RIASEC variables) only four were significant: Extraversion correlates with Social and Enterprising interests, openness correlates with Artistic and Investigative, thus largely confirming the former findings (cf. also Larson, Rottinghaus & Borgen, 2002). A more recent study that included also the HEXACO model could show similar findings for the FFM but partially higher R's for the HEXACO that was superior in predicting Realistic, Enterprising and Conventional interests (.18 to .40, depending also on sex; McKay & Tokar, 2012).

1.3 Incremental Validities of Abilities, Personality, and Vocational Interests

There is only little research looking at all three groups of individual differences variables simultaneously, and that comes mostly from one researcher, Phil Ackerman. By and large, his findings are reflected in the above mentioned meta-analyses, additionally he reported conscientiousness correlated with Conventional interests; regarding openness also relations with Investigative and Artistic were reported, but additionally openness was related with Social interests.

On the basis of these relations and those with personality traits Ackerman formulated his intelligence as process, personality, interests and intelligence as knowledge (PPIK) theory, in which he postulated four so-called "trait complexes": A – The "Social" complex combines Enterprising and Social interests with extraversion, social potency and well-being. B – the "Clerical/Conventional"-complex with perceptual speed as ability, Conventional as interests and the personality traits control, conscientiousness and traditionalism. C – the "Science/Math"-complex with math reasoning, visual perception, and Realistic and Investigative interests and D – the "Intellectual/Cultural"-complex with Gc and ideational fluency as investigative and Artistic interest and openness and typical intellectual engagement as traits (Ackerman, 1996; Ackerman & Heggestad, 1997).

Apart from developing "trait complexes" the relationships between abilities, personality traits and interests are also of interest from the viewpoint of incremental validities. Studies on this classical question of the incremental validity are rare. Still the main finding of the seminal meta-analyses by Hunter and Hunter (1984) and Schmidt and Hunter (1998) has not been challenged today: That –apart from work samples– nothing correlates as high with job success as intelligence. According to these meta-analyses from the tested 18 predictor variables it was only three (four) other assessments/traits that provided a substantial (>10% explained variance) enhancement of prediction of overall job performance: work samples, structured interviews and integrity tests (the conceptually related conscientiousness variable provided 9% additionally explained variance).

Besides from these meta-analyses only single studies on incremental validities of personality, interests and other psychological variables over and above intelligence can be found. These mostly focussed on "alternative intelligences" like "multiple intelligences", emotional intelligence, practical intelligence, but could not show any convincing evidence that these "alternative intelligences" can provide incremental validity over and above intelligence, personality and interests (a review of this literature can be found in Rost,

2013). Apart from this rather specific literature there is little research on incremental validities; in fact, we could not locate any single study on the prediction of job success that included all three groups of predictor variables (abilities, personality traits, interests). Austin and Hanisch (1990) used Project TALENT data to predict occupational attainments and using abilities and interests, but personality traits were not assessed. Illiescu, Ispas, Sulea and Ilie (2015) assessed the prediction of counter-productive work behaviour on the basis of vocational fit (assessment of interests) and personality traits (Big Five, Dark Triad, and others) but abilities were not assessed. Ziegler, Dietl, Danay, Vogel and Bühner (2011) predicted apprentices' training success using general mental ability and structured vs. unstructured interviews, and found incremental validity for structured but not for unstructured interviews over and above GCA, but personality traits and interests were not assessed.

1.4 Specifics of the Sample

Why should one study apprenticeship success? Apprenticeship is an alternative dual-track model of vocational education for 15-19 year olds in domains of craftsmanship and other non-academic fields (see below), where students spend most of their time in a company and go to school only about 20% of their work time, either one day a week or in a blocked mode (a good description of the apprenticeship system in Austria is given in Hamilton & Lempert, 1996). Although being implemented in only few countries worldwide, especially in recent years of economic crises it has received high praise in politics and economy as the economic success of those countries in spite of crises has also been attributed to this dual-track system. Advantages listed are: lower unemployment rates in youth, high success rates in competitions like "Worldskills", and at the same time there is flexibility with respect to higher (academic) careers. Psychological research on apprenticeship is rare; and it mostly focusses on aspects of career choice (e.g. Heckhausen & Tomasik, 2002; Dumfart, Krammer, & Neubauer, 2016), effects on socialization and personality development (Hamilton & Lempert, 1996). An exception is the study by Volodina, Nagy and Köller (2015): comparing first-year-apprentices of two professions they found abilities to be unimportant in the prediction of success and satisfaction, whereas vocational interest explained variance in the success over and above personality.

1.5 The Present Study

From the literature reviewed here so far, we would derive that cognitive abilities/intelligence correlate highest with job success (.5 and higher), personality traits—mostly from the FFM—up to .30, and interests usually around .2, maximum .3. But how is the prediction if, as usual in work and organizational psychology or human resources applications, measures from these domains are being combined; can the prediction be improved and what kind of psychological variables can provide incremental validity over the other? For example, does it make sense to combine intelligence measures with classical personality traits or with interest scales? Or does a combination of all three measures still improve the prediction of job success. And which group of specific predictors works best in which

class of (apprenticeship) jobs?

In the present study, we sought to address these questions on the basis of a broader than usual assessment of abilities, traits, and interests by employing/developing new (enhanced) taxonomies especially for abilities and for interests:

- (1) an ability taxonomy including the domains of verbal, numerical and figural abilities as well as three “alternative abilities”: social-emotional competencies, divergent thinking ability and practical-scientific competence;
- (2) the big five taxonomy was administered in the classical form for extraversion, neuroticism, openness, and agreeableness, but—because of its pervasive importance for professional success and on the basis of findings from pilot studies—conscientiousness was assessed on the facet level;
- (3) on the basis of the (Austrian version of) International Classification of Occupations (Statistik Austria, 2011) we developed an updated and enhanced interest taxonomy that should reflect better the modern professional world. The following professional domains are considered here: Office, Business administration, Personal services, IT, Leadership, Gastronomy, Craft, Law, Art, Farming, Assembly, Social, Sales, and Science.

Accordingly, we hypothesized, that grade point average (GPA) will be predicted better by (cognitive) abilities than by personality and interest. In contrast, we expect job and school satisfaction to be predicted better by the personality and interest scales.

2 Methods

2.1 Sample

Consisting of apprentices from twelve occupations as well as students of six higher vocational schools the sample covered the major occupational groups (Table 1); it should be noted, though, that Branch 4 also included AHS which is the usual high school leading to academic studies. The occupations covered here account for the majority of 65.37% of Austrian apprentices, in that the top 10 of all apprenticeship branches are represented (Wirtschaftskammer Österreich, 2015). From the total of 648 participants, 17 had to be excluded due to excessive missing data. The age of the remaining 631 participants ranged from 15 to 44 (Mean=17.92; SD=3.08) with 98% being younger than 26 years; 65.5% of this sample were male.

Table 1: Description of Investigated Groups

Branch	Profession/school type	<i>N</i>	Age	Male	Female
1 (N = 130)	Agricultural school	51	16.32	6	45
	Baker	33	17.74	16	17
	Cook	13	17.38	6	7
	Gastronomy	33	16.81	16	17
2 (N = 156)	Engineering school	42	15.40	29	13
	Metal Engineering	48	19.28	47	1
	Electrical Engineering	47	17.56	47	-
	IT	19	19.31	17	2
3 (N = 102)	Nursing	32	25.27	4	28
	BAKIP (Kindergarden t.)	26	16.52	2	24
	Hairdresser	19	18.53	3	16
	Florist	25	17.80	2	23
4 (N = 115)	AHS	20	17.30	4	16
	HAK	47	17.17	16	31
	Office	9	18.11	-	9
	Sales	39	18.95	11	28
5 (N = 128)	Joiner	41	17.74	31	10
	Bricklayer	39	17.87	39	-
	Installations	48	17.79	47	1

Note. AHS = academic secondary school upper level; BAKIP = training institution for early childhood education; HAK = commercial academy; HLW = upper level institute for tourism and commercial professions; HTL = upper level technical institute; nursing = school for healthcare and nursing.

2.1.1 Branches

Having small (N=9; office) to medium (N=51; agricultural school) sample sizes per occupation we decided to cluster occupations into branches. Clustering was performed according to the requirement analysis of Bergner, Saurugg and Neubauer (2014), who extracted the requirements of over 6000 occupations from two major occupational databases (European Dictionary of Skills and Competences; DISCO; Berufs-Informationen-Computer; BIC). Branches were configured by grouping occupations of similar requirements according to Bergner et al (2014). The five branches are:

1. Food: cook, gastro, baker, agricultural school
2. Tech: engineering school, IT, electrician, metal technician
3. People: nurse, kindergarten teacher, hairdresser, florist
4. Paper: high school, trade school, office, sales
5. Craft: plumber, carpenter, bricklayer

2.2 Measures

2.2.1 Cognitive and Alternative Abilities

Cognitive abilities were measured with the Talente Check (Neubauer, Ortner, Weienbacher, Katholnig, & Diedrich, 2016) – a test battery constructed as a screening tool measuring three cognitive (verbal, numerical, and spatial intelligence) and three non-cognitive (social-emotional competence, creative potential, practical-scientific competence) abilities with one subtest each.

Verbal intelligence was assessed with a similarities task consisting of 15 items to be solved in three minutes. The test of numerical intelligence used 20 number series items to be solved in twelve minutes. Figural intelligence was evaluated with 24 figures to be mentally assembled in eight minutes. All cognitive test showed sufficient internal consistency (Cronbach's Alphas: similarities $\alpha=.58$; number series $\alpha=.88$; figure assembling $\alpha=.69$). The internal consistency of similarities was low, but this test proved to be Rasch-homogenous according to the criteria of median (LRT $p=.3$) and mother tongue (LRT $p=.138$; Neubauer et al., 2016).

Social-emotional competence was measured by a situational judgement test ("Situativer Test für Emotionale Kompetenz"; STEK; Neubauer et al., 2016). This test presents students with 19 vignettes for which they had to choose their typical reaction to a situation which evokes emotions in themselves (intrapersonal-) or others (interpersonal competency). Adequacy of the four alternative responses was rated beforehand by experts such as psychotherapists or teachers. Having no time constraints, the STEK takes students around 15 to 20 minutes to complete. Internal consistency, as assessed by Cronbach's Alpha was .72 and the facets of intra- and interpersonal competency correlated at $r=.46$ allowing for the calculation of a common mean value.

The test of creative potential encompassed three divergent thinking tasks: a figure completion task, an alternate uses task, and an instances task. Each task was constrained to three minutes and instructions asked to "find as many ideas possible, that will work but aren't found by all people". All ideas were judged according to their originality by three independent persons on a four-point scale (1= "common, not useful or new" to 4= "very uncommon, new and useful") (Diedrich, Benedek, Jauk, & Neubauer, 2015). Interrater reliability was sufficient for all tasks (figure completion $\alpha=.56$; alternate uses $\alpha=.48$; instances $\alpha=.48$; Neubauer et al., 2016). Originality ratings of each idea were averaged within tasks and z-standardized. These standardized z-scores for each task

were then averaged across tasks and finally z-standardized to obtain a single creative potential score for each participant.

Practical-scientific competence was assessed with 18 items asking for the application of (natural-)science-principles to everyday problems. Correct response should be given either in the single-choice format or in open-ended questions. The latter were coded according to a strict coding scheme for each item. No time constraints apply, but the 18 items need on average about 20 minutes to complete. Internal consistency was Cronbach's $\alpha=.65$ (Neubauer et al., 2016).

As mentioned above these cognitive and alternative abilities belong to the "Talente Check". This test battery has proven its reliability and validity in several pilot studies (Neubauer et al., 2016; Schwab, 2009).

2.2.2 Personality and Motivation

Being constructed especially for the prediction of school- and vocational success the personality and motivation scale (Persönlichkeits- und Motivationscreening für die Bildungs- und Berufswahl; PMBB; Dumfart & Neubauer, 2016) encompasses all big five factors: openness to experiences, emotional stability, extraversion, and agreeableness at the factor-level and conscientiousness at the facet-level. Conscientiousness facets included ambition, self-discipline, thoughtfulness, and dutifulness; these were the facets that proved to be predictive in pilot studies for the development of this test (Dumfart & Neubauer, 2016). General self-efficacy was assessed as the most reliable predictor of school- and vocational success in the domain of motivation (vocational success: Abele & Spurk, 2009; Abele, Stief, & Andrä, 2000; Judge & Bono, 2001; school success: Caprara, Vecchione, Alessandri, Gerbino, & Barbaranelli, 2011; Richardson, Abraham, & Bond, 2012). For both, the big five and the self-efficacy questionnaires responses were to be given on a four-point Likert-type scale from 1 (= I agree) to 4 (= I do not agree; sample item of conscientiousness "My room is always tidy."). Internal consistency ranged from .60 to .85 for all scales and Rasch-homogeneity can be assumed for the split-criteria of gender (all LRT's ns) and mother tongue (all LRT's ns). General self-efficacy, the facets of conscientiousness, and the factors of the remaining big five traits all yielded separate scores calculated as the average of all items in the respective domain.

2.2.3 Vocational Interests

As explained in the introduction, the construction of the vocational interest scale aimed at using practical operations as items which are known by students of that age, and that are typical of the respective branch. If feasible, also less favourable operations of that branch were chosen in item construction (e.g. "craming cows for meat production" for the domain of farming; Interessenstest für die Bildungs- und Berufswahl; IBB; Katholnig, Krammer, & Neubauer, 2015). IBB allowed for the assessment of 14 branches adapted from the ÖISCO (Austrian adaptation of the International Standard Classification of Occupations; Statistik Austria, 2011): Office, leadership, assembly, art, farming, craft, personal services, law, science, gastronomy, sales, social, business administration, and IT.

Each scale consisted of eight to ten items for which students had to decide whether they were “interesting” or “uninteresting” for them. The number of “interesting”-responses were summed for each branch. Internal consistencies ranged from .71 to .90 and Rasch-homogeneity can be assumed for the split-criteria median (all LRT ns, except for art, $p < .01$) and mother tongue (all LRT ns).

2.2.4 Job/School Satisfaction

Satisfaction with school or job was assessed separately for the students of higher vocational schools and apprentices. The job satisfaction questionnaire was adapted from the “Profilanalyse der Arbeitszufriedenheit” (profile analysis of job satisfaction; PAZ; Jimenez, 2010) and studies from adolescents’ values. Köcher, Hurrelmann and Sommer (2013) and Scharinger and Ehetreiber (2014) found the following criteria to be the most important for job satisfaction: good payment, interesting tasks, a safe employment, good social surrounding, enough leisure time, low achievement pressure, and enough freedom of choice. These criteria were assessed with 17 items (including one overall and one open-ended item).

The school satisfaction questionnaire for students paralleled that of apprentices’ job satisfaction – e.g. social surrounding was assessed with “how satisfied are you ... with the contact to your colleagues” in apprentices vs. “how satisfied are you ... with the contact to your classmates” in students. The student’s questionnaire totaled 16 items.

Both questionnaires used four-point Likert-type scale from 1 (= very unsatisfied) to 4 (= very satisfied). In both questionnaires satisfaction-items were averaged and achievement motivation items were summed. Internal consistencies were .90 for job- and .85 for school satisfaction and both scales showed one factor solutions in exploratory factor analysis.

2.2.5 Sociodemographics and Grades

All participants provided their sex, date of birth and mother tongue (plus age at which they started learning German, if applicable). Furthermore, we asked them for several grades conditional to the school they were attending or the occupation they were learning – e.g. prospective florists were inquired after their botany grade. Grade point averages were computed by adding all grades of that domain and dividing across the number of grades of that domain. In order to achieve comparability between domains these average grades (GPA) were z-standardised within each domain.

2.3 Procedure and Statistical Analysis

Classes volunteering for the participation in this study received €50.- in total and were tested by psychologically-trained and experienced teachers in winter 2015. All students provided written consent—either in person or by their parents in advance. The whole study was conducted in paper-and-pencil format and took three hours per class: two hours for cognitive and alternative abilities and one hour for the other questionnaires

listed in the measures section. All tests and questionnaires were digitalized and automatically coded, except for practical-scientific competence, which was manually coded, and for creative potential that was judged for ideational originality by three independent judges.

Sum or mean scores of all measures were calculated as described in the respective manuals (Dumfart & Neubauer, 2016; Katholnig, Krammer, & Neubauer, 2015; Neubauer et al., 2016). To account for the differing variances among occupations grade point averages were calculated and z-standardized within each occupation.

Aiming at the assessment of the incremental validities of alternative abilities, personality and motivation, and vocational interests over and above intelligence hierarchical regression analyses were calculated for each branch individually. To this end, we used GPA as well as JSS as the criteria to be predicted by five sets of predictors: First, the three intelligence dimensions; second, the three alternative abilities; third the facets of conscientiousness; fourth, the other four big five factors; and fifth, the 14 domains of vocational interest. For each branch, only predictors showing significant bivariate correlations with the criterion were included in the regression analysis, thus yielding varying numbers of predictors in the regression analyses (Table 3). The order of steps was chosen on two bases: First, taking into account the average correlations of the respective predictor groups (on the bases of meta-analyses, where possible, cf. the introduction): Intelligence correlates highest with professional success, followed by conscientiousness, followed by the other big five, and finally by interests that moreover are the most (domain) specific predictors. For alternative abilities, no meta-analyses are available but here the rationale was to enter them in the second step because of their performance-type nature, whereas the measures in steps 3 to 5 are of self-report nature.

Each of these hierarchical regression analyses was run twice, once with GPA and once with JSS as criterion variable. Contrasting the “hard” achievement criterion of GPA with the “soft” criterion of JSS allows for a broader assessment of the predictors incremental power over and above each other.

3 Results

3.1 Descriptive Statistics and Correlations

Descriptive Statistics of all predictors and the criteria can be found in Table 2. Distributions exceeding the $|\text{Skew}| > 1$ should be regarded as skewed (Blumer, 1973; Tabachnik & Fidell, 2007). This is the case only for interest for personal services (right-skewed).

Analysing correlations of gender (1=female, 2=male) with intelligence, alternative abilities, personality and interests meaningful ($r > .3$) relationships existed between gender and emotional stability ($r = .31$; $p < .01$) and also agreeableness ($r = -.30$; $p < .01$) as well as interests in personal service ($r = -.44$; $p < .01$), IT ($r = .31$; $p < .01$), gastronomy ($r = -.41$; $p < .01$), crafts ($r = .52$; $p < .01$), arts ($r = -.49$; $p < .01$), assembling ($r = .53$; $p < .01$), and social ($r = -.42$; $p < .01$). The intercorrelations of all variables are given in the appendix A1. Intelligence domains showed the highest correlations amongst themselves ($r = .30$ to $.42$; $p < .01$) whereas alternative abilities correlated low with each other

Table 2: Descriptive Statistics of all Predictors and Criteria

	<i>M</i>	<i>Md</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>	<i>Skew</i>	<i>Kurt</i>
VA	9.39	10.00	2.16	1	13	-0.50	-0.25
NA	11.93	12.00	4.86	0	20	-0.22	-0.68
SA	9.65	10.00	3.22	2	18	-0.06	-0.66
SEC	2.85	2.87	0.44	1.60	3.87	-0.22	-0.18
Crea	2.01	2.01	0.14	1.60	2.73	0.10	1.18
PSC	6.74	7.00	1.91	0	12	-0.37	-0.05
Th	3.10	3.00	0.53	1	4	-0.52	0.36
Am	3.14	3.14	0.46	1	4	-0.58	0.57
Du	2.90	2.86	0.53	1	4	-0.28	-0.19
Sd	2.94	3.00	0.46	1.29	4	-0.61	0.67
A	3.02	3.13	0.44	1.13	4	-0.70	1.29
E	2.71	2.75	0.46	1	4	-0.19	0.37
ES	2.74	2.75	0.53	1	4	-0.40	0.40
O	2.65	2.63	0.50	1.38	4	0.21	-0.28
SE	3	3.00	0.49	1	4	-0.36	0.82
Off	2.61	2.00	2.13	0	8	0.59	-0.44
Bad	4.37	4.00	3.09	0	10	0.16	-1.16
Per	1.91	1.00	2.39	0	10	1.23	0.45
IT	3.03	3.00	2.52	0	7	0.28	-1.32
Lead	4.15	4.00	2.54	0	8	-0.01	-1.19
Gast	2.95	2.00	2.51	0	8	0.47	-1.02
Craft	3.84	3.00	3.25	0	10	0.41	-1.22
Law	3.77	3.00	2.63	0	8	0.19	-1.23
Art	3.02	2.00	2.99	0	10	0.83	-0.47
Farm	2.66	2.00	2.95	0	10	0.96	-0.25
Ass	4.33	4.00	3.40	0	10	0.23	-1.35
Soc	3	2.00	2.82	0	8	0.43	-1.28
Sal	2.78	2.00	2.49	0	8	0.54	-0.89
Sci	4.23	4.00	3.01	0	10	0.33	-1.06
JSS	2.99	3.00	0.57	1.19	4	-0.32	-0.33
Grades	0	-0.09	0.98	-2.19	3.09	0.26	-0.40

Note. M = mean; Md = median; SD = standard deviation; Min = minimum; Max = maximum; Skew = skewness; Kurt = Kurtosis; VA = Verbal Ability; NA = Numerical Ability; SA = Spatial Ability; SEC = Social-Emotional Competence; Crea = Creativity; PSC = Practical-Scientific Competence; Th = Thoughtfulness; Am = Ambition; Du = Dutifulness; Sd = Self-discipline; A = Agreeableness; E = Extraversion; ES = Emotional Stability; O = Openness to experience; SE = Self-Efficacy; Off = Office; Bad = Business Administration; Per = Personal Service; Lead = Leadership; Gast = Gastronomy; Farm = Farming; Ass = Assembly; Soc = Social; Sal = Sales; Sci = Science; JSS = Satisfaction (students filled out the students questionnaire, apprentices filled out the apprentices questionnaire).

($r = .04$; ns. to $r = .15$; $p < .01$) and low to medium ($r = -.03$; ns. to $r = .36$; $p < .01$) with cognitive abilities. Correlations between facets of conscientiousness were moderate to high ($r = .29$ to $.61$; $p < .01$); the other big five factors were either not or lowly/moderately correlated ($r = .00$; ns. to $r = .27$; $p < .01$). The motivational variable of self-efficacy showed positive correlations with all personality dimensions, especially emotional stability ($r = .45$; $p < .01$) and the conscientiousness facet of ambition ($r = .45$; $p < .01$). Ranging from $r = .0$ (ns; science*personal service, office*assembly and leadership*farming) to $r = .84$ ($p < .01$; assembly*crafts) domains of vocational interest showed the broadest spectrum of correlations.

3.2 Regression Analyses

In order to reduce the large number of predictors and avoid potential suppressor effects as best as possible we decided to use in each step only those predictors that showed a significant correlation with the respective criterion (Table 3). For the sake of brevity only the beta weights (and their significance) for the significant regression steps will be displayed in the regression tables.

3.3 Criterion GPA

Considering the Food-branch (agricultural school, cook, baker, gastronomy; **branch 1**) intelligence, the facets of conscientiousness, and vocational interests were the significant predictor steps (Table 4). Among intelligence it was verbal ability ($\beta = .23$; $p < .05$), among conscientiousness it was dutifulness ($\beta = .25$; $p < .01$), and among vocational interest it was the non-interest in IT ($\beta = -.18$; $p < .05$) which significantly explained variance in the GPA. In total 37% variance could be explained by these steps.

The GPA of apprentices and students in the Tech branch (engineering school, metal engineering, electrical engineering, IT; **branch 2**) could be predicted significantly only by intelligence, especially verbal intelligence ($\beta = .21$; $p < .05$). Only 10% variance could be explained by this step 1 and further steps did not significantly improve the prediction.

Success in kindergarten teacher school, nursing school, hairdresser, and florist – all working mainly with people (**branch 3: People**) – was predicted by intelligence and alternative abilities. Although the step of cognitive abilities as a whole reached significance, none of the individual predictors reached significance, a phenomenon that will be dealt with in the discussion. Therefore, only social-emotional competence in step 2 significantly predicted success in the People branch ($\beta = -.29$; $p < .01$). In total 15% variance could be explained.

GPA in the Paper branch (**branch 4**), consisting of High school, trade school, office, and sales was predicted by intelligence (numerical intelligence: $\beta = .29$; $p < .05$) in step 1; in step 2 – conscientiousness (facet ambition: $\beta = .34$; $p < .01$) and in step 3 by vocational interests (science: $\beta = .20$; $p < .05$). In total 37% variance could be explained. It was interesting to observe that in steps 2 and 3 verbal ability instead of numerical ability became significant.

Occupational success in the Crafts branch (carpenter, bricklayer, installation; **branch**

Table 3: Bivariate correlations of predictors and criteria separate for the branches

	Branch 1 (Food)		Branch 2 (Tech)		Branch 3 (People)		Branch 4 (Paper)		Branch 5 (Craft)	
	GPA	JSS	GPA	JSS	GPA	JSS	GPA	JSS	GPA	JSS
VA	.33**	-.14	.28**	.03	.13	.02	.24*	-.02	.28**	-.20*
NA	.30**	-.18*	.25**	.15	.23*	.05	.33*	.16	.31**	-.01
SA	.20*	-.15	.18*	.16*	.22*	-.02	.10	.03	.18*	-.24**
SEC	.15	.32**	-.04	.08	.33**	.26**	.11	.20*	.11	.22*
Crea	.07	-.04	.07	.04	.16	.11	.09	.22*	.12	.11
PSC	.18*	-.02	.09	-.08	-.04	.05	.15	-.06	.16	-.12
Th	.11	-.01	-.09	.13	.14	-.04	.03	.03	.10	.10
Am	.30**	.14	.16	.40**	.05	.35**	.46**	.29**	.30**	.17
Du	.36**	.21*	-.03	.29**	.09	.20*	.22*	.19*	.08	.14
Sd	.28**	.23**	.03	.32**	.15	.34**	.33**	.27**	.24**	.24**
A	.02	.18*	-.03	.21*	.16	.15	.16	.08	-.04	.20*
E	.25**	.13	.10	.15	-.09	.08	-.02	.04	.22*	.06
ES	.13	.19*	.01	.23**	.14	.15	.02	.22*	.12	.13
O	.15	-.02	.11	.18*	-.06	.08	.10	-.04	.08	.10
SE	.27**	.26**	.12	.25**	-.07	.20*	.06	.04	.12	.25**
Off	-.04	.10	-.08	.09	-.06	-.03	-.04	.14	-.07	.13
Bad	-.11	.02	-.03	.02	-.13	-.25*	.17	.12	.14	.20*
Per	-.09	-.09	.10	-.10	.02	.05	-.05	.02	-.12	.02
IT	-.21*	-.11	-.07	-.02	.10	-.02	-.07	.22*	-.11	.03
Lead	.05	.11	.02	.10	-.15	-.02	.09	.02	.10	.21*
Gast	.18*	.27**	-.02	-.09	-.04	.03	.08	.06	-.05	-.03
Craft	-.22*	-.06	-.01	.21*	-.01	.08	-.03	-.13	-.01	.47**
Law	-.03	-.09	-.06	-.08	-.09	-.27**	.20	-.03	.03	-.05
Art	.04	-.06	.02	-.07	.06	-.13	.07	-.22*	-.01	-.23*
Farm	.11	.19*	.04	-.02	-.01	.04	.16	-.06	.13	.09
Ass	-.16	.13	-.07	.13	.05	.09	.07	.08	-.05	.39**
Soc	-.07	.01	-.04	-.19*	.08	-.09	.15	.11	-.13	-.05
Sal	.03	.17	-.07	.00	.05	.03	.07	.31**	-.19*	.11
Sci	-.11	-.05	.13	-.06	-.15	.11	.23*	.01	.04	.08

Note. GPA= Great point average; JSS= job/school satisfaction; VA = Verbal Ability; NA = Numerical Ability; SA = Spatial Ability; SEC = Social-Emotional Competence; Crea = Creativity; PSC = Practical-Scientific Competence; Th = Thoughtfulness; Am = Ambition; Du = Dutifulness; Sd = Self-discipline; A = Agreeableness; E = Extraversion; ES = Emotional Stability; O = Openness to experience; SE = Self-Efficacy; Off = Office; Bad = Business Administration; Per = Personal Service; Lead = Leadership; Gast = Gastronomy; Farm = Farming; Ass = Assembly; Soc = Social; Sal = Sales; Sci = Science.

5) were significantly predicted by steps 1 (intelligence) and incrementally by step 2 (conscientiousness) and by step 4 (vocational interest). In step 1, verbal abilities reached significance ($\beta=.23$; $p<.05$), and among conscientiousness facets self-discipline ($\beta=.21$; $p<.05$) and ambition ($\beta=.20$; $p<.05$) contributed significantly. In the last step of vocational interest non-interest in sales incrementally added to the prediction of success ($\beta=-.18$; $p<.05$). In total 29% variance could be explained after step 4.

Table 4: Hierarchical regression predicting GPA

Branch 1 (Food)				
	R^2	ΔR^2	β	t
Step 1 (Cog)	.15	.15 F(3, 122)=7.13**		
Step 2 (Alt)	.15	.00 F(1, 121)=0.01		
Step 3 (Con)	.29	.14 F(3, 118)=7.95**		
Step 4 (oB5)	.32	.03 F(2, 116)=2.65		
Step 5 (Int)	.37	.05 F(3, 113)=2.83*		
	Step 1	VA ⁺	.23	2.50*
	Step 3	VA ⁺	.24	2.62**
		Du	.25	2.32*
	Step 5	SA	.17	2.09*
		Du	.28	2.51*
		IT	-.18	-2.17*
Branch 2 (Tech)				
	R^2	ΔR^2	β	t
Step 1 (Cog)	.10	.11 F(3, 146)=5.60**		
	Step 1	VA ⁺	.21	2.34*
Branch 3 (People)				
	R^2	ΔR^2	β	t
Step 1 (Cog)	.07	.07 F(2.89)=3.27*		
Step 2 (Alt)	.15	.08 F(1,88)=8.09**		
	Step 2	SEC	.29	2.84**

Branch 4 (Paper)				
	R^2	ΔR^2	β	t
Step 1 (Cog)	.13	.13 F(2,82)=5.87**		
Step 2 (Con)	.34	.21 F(3,79)=8.34**		
Step 3 (Int)	.37	.04 F(1,78)=4.59*		
	Step 1	NA ⁺	.29	2.54*
	Step 2	VA	.22	2.14*
		Am	.34	3.18**
	Step 3	VA	.24	2.39*
		Am	.28	2.56*
		Sci	.20	2.14*
Branch 5 (Craft)				
	R^2	ΔR^2	β	t
Step 1 (Cog)	.13	.13 F(3,115)=5.84**		
Step 2 (Con)	.25	.22 F(2,113)=8.37**		
Step 3 (Alt)	.26	.01 F(1,112)=1.60		
	Step 2	VA	.23	2.43*
		Am	.20	2.23*
		Sd	.21	2.22*
	Step 4	VA	.21	2.24*
		Am	.19	2.02*
		Sd	.21	2.30*
		Sal	-.18	-2.10*

Note. * = $p < .05$; ** = $p < .01$; + = no significant β in the last significant regression step; Branch 2 NA tendency $\beta = 0.17$, $p = .057$; Branch 3 & 5 no significant β in Step 1; Cog = Cognitive Abilities; Alt = Alternative Abilities; Con = Conscientiousness Facets; oB5 = other Big Five factors; Int = Interests; VA = Verbal Ability; NA = Numerical Ability; SA = Spatial Ability; SEC = Social-Emotional Competence; Am = Ambition; Du = Dutifulness; Sd = Self-discipline; Sal = Sales; Sci = Science.

3.4 Criterion Job/School Satisfaction

In the Food branch (**branch 1**) cognitive abilities (Step 1), alternative abilities (Step 2) and other traits (Step 4) could predict JSS (Table 5). In Step 1 it was low numerical ability ($\beta = -.18$; $p < .05$), in Step 2 high social-emotional competence ($\beta = .32$; $p < .01$), and in Step 4 self-efficacy ($\beta = .20$; $p < .05$) which contributed to the prediction of satisfaction. With Step 4 in total 20% variance could be explained.

Apprentices' and students of technical occupations (**branch 2**) satisfaction was predicted by cognitive abilities (spatial ability: $\beta = .21$; $p < .05$) and conscientiousness (ambition: $\beta = .30$; $p < .01$). In Step 4 (vocational interest) non-interest in social occupations reached significance ($\beta = -.25$; $p < .05$). In total 34% of the variance in satisfaction could be explained.¹

Predicting satisfaction in occupations working with people (**branch 3**) the predictor sets of alternative abilities (here step 1; $R^2 = .07$; $p < .05$; with social-emotional ability, $\beta = .26$, $p < .01$) and conscientiousness facets (here step 2; $\Delta R^2 = .09$; $p < .05$; with ambition, $\beta = .22$, $p < .05$) could explain 16% variance in the criterion. Step 4 (vocational interest) reached significance as a whole (and rose variance explained to 25%) but surprisingly individual predictors did not (this phenomenon will be dealt with in the discussion).

Regarding paper based occupations (**branch 4**) alternative abilities, facets of conscientiousness, big five factors, and vocational interests explained variance in JSS. Specifically, social-emotional competence ($\beta = .19$, $p < .05$), creativity ($\beta = .21$, $p < .05$), ambition ($\beta = .22$; $p < .05$), emotional stability ($\beta = .20$; $p < .05$), as well as the interest in sales ($\beta = .24$; $p < .01$) and the non-interest in arts ($\beta = -.23$; $p < .01$) contributed. In total 33% variance could be explained.

Finally, apprentices of Craft (**branch 5**) satisfaction could be predicted by intelligence, alternative abilities, other big five, and vocational interests (steps 1, 2, 4, and 5). In the first step spatial ability contributed, but surprisingly negatively ($\beta = -.21$, $p < .05$). In the second step social-emotional competence provided a positive contribution ($\beta = .19$, $p < .05$). The fourth step yielded self-efficacy as a significant predictor ($\beta = .21$; $p < .05$). In the final step only interest in crafts ($\beta = .40$; $p < .01$) and non-interest in arts ($\beta = -.28$; $p < .01$) provided contributions; all other predictors lost their explanatory power. The total variance explained was 35%.

¹Please note that although step 3 (other big five) showed only a tendency and is thus not reported in the table 5. Nevertheless, agreeableness emerged as a predictor in step 4.

Table 5: Hierarchical regression predicting JSS

Branch 1 (Food)				
	R^2	ΔR^2	β	t
Step 1 (Cog)	.03	.03 F(1,127)=4.03*		
Step 2 (Alt)	.13	.10 F(1,126)=14.70**		
Step 3 (Con)	.14	.01 F(2,124)=0.59		
Step 4 (oB5)	.20	.06 F(3,121)=3.00*		
Step 5 (Int)	.23	.03 F(2,119)=2.67		
	Step 1	NA	-.18	-2.01
	Step 2	NA	-.18	-2.11*
		SEC	.32	3.83**
	Step 4	NA	-.21	-2.55*
		SEC	.26	2.42*
		SE	.20	1.99*
Branch 2 (Tech)				
	R^2	ΔR^2	β	t
Step 1 (Cog)	.04	.04 F(1,142)=6.41*		
Step 2 (Con)	.23	.19 F(3,139)=11.10**		
Step 3 (oB5)	.28	.05 F(4,135)=2.42		
Step 4 (Int)	.34	.05 F(2,133)=5.49**		
	Step 1	SA	.21	2.53*
	Step 2	SA	.20	2.73**
		Am	.30	3.03**
	Step 4	SA	.18	2.51*
		Am	.25	2.48*
		A	.21	2.79**
		Soc	-.25	-3.26**
Branch 3 (People)				
	R^2	ΔR^2	β	t
Step 1 (Alt)	.07	.07 F(1,100)=7.25**		
Step 2 (Con)	.16	.09 F(3,97)=3.44*		
Step 3 (oB5)	.16	.00 F(1,96)=0.42		
Step 4 (Int)	.25	.09 F(2,94)=5.69**		
	Step 1	SEC+	.26	2.69**
	Step 2	Am+	.22	1.85*

Branch 4 (Paper)				
	R^2	ΔR^2	β	t
Step 1 (Alt)	.08	.08 F(2,111)=5.10**		
Step 2 (Con)	.15	.07 F(3,108)=2.93*		
Step 3 (oB5)	.19	.03 F(1,107)=4.54*		
Step 4 (Int)	.33	.14 F(3,104)=7.13**		
Step 1		SEC ⁺	.19	2.03*
		Crea	.21	2.35*
Step 2		Crea	.20	2.24*
		Am+	.22	2.15*
Step 3		Crea	.20	2.30*
		ES ⁺	.20	2.13*
Step 4		Crea	.24	2.85**
		Art	-.23	-2.65**
		Sal	.24	2.72**
Branch 5 (Craft)				
	R^2	ΔR^2	β	t
Step 1 (Cog)	.08	.08 F(2,116)=4.83*		
Step 2 (Alt)	.11	.04 F(1,115)=4.59*		
Step 3 (Con)	.13	.02 F(1,114)=2.16		
Step 4 (oB5)	.18	.05 F(2,112)=3.20*		
Step 5 (Int)	.35	.18 F(5,107)=5.87**		
Step 1		SA ⁺	-.21	-2.20*
Step 2		SEC ⁺	.19	2.14*
Step 4		SA ⁺	-.19	-2.00*
		SE ⁺	.21	2.21*
Step 5		Craft	.40	3.11**
		Art	-.28	-3.12**

Note. * = $p < .05$; ** = $p < .01$; = $p < .10$; + = no significant β in the last significant regression step; Branch 2 NA tendency $\beta = 0.17$, $p = .057$; Branch 3 & 5 no significant β in Step 1; Cog = Cognitive Abilities; Alt = Alternative Abilities; Con = Conscientiousness Facets; oB5 = other Big Five factors; Int = Interests; NA = Numerical Ability; SA = Spatial Ability; SEC = Social-Emotional Competence; Crea = Creativity; Am = Ambition; A = Agreeableness; ES = Emotional Stability; SE = Self-Efficacy; Soc = Social; Sal = Sales; Sci = Science.

4 Discussion

In the following we will summarize and discuss the findings. First, we will discuss the different contributions of the five groups of predictors: Intelligence factors, alternative abilities, conscientiousness facets, other big five and self-efficacy traits and finally interests. In a second part, we will turn to the discussion of the overall prediction in general and in the specific branches before naming possible limitations of this study.

4.1 Predictors of Success

Starting with the groups of predictors we can generally see that intelligence factors, which usually are considered the best predictor of professional success, fared well in predicting the hard criterion GPA (in all five branches sig., with 7 to 15% variance explanation). Relatively the lowest but still significant contribution was found in the “People” branch: For this group (nurse, kindergarten teacher, hairdresser, florist) cognitive intelligence seems to be of lower importance, here rather the social-emotional competence seems important for success (providing 15% variance explained, 8% incremental over the contribution of intelligence factors). This was the only branch where any of the alternative abilities could provide a substantial contribution to the prediction of the educational-professional success as reflected in GPAs.

The second best group of predictors for the GPA criterion are the conscientiousness facets that contribute incrementally on three (Food, Paper, Craft) of five branches and give even higher validity increments (12 to 22%) as compared to intelligence. The combination of intelligence with conscientiousness seems to be a kind of “all-purpose” set of predictors that is then enhanced through the additional inclusion of some specific interests (partially “non-interests”).

Broadly speaking, the other big five traits plus self-efficacy play no role in predicting success in terms of GPA.

As mentioned interests can in three of five branches enhance the prediction of GPA with contributions of 3 to 8% of explained variance. Most interesting is here that in two branches (Food and Craft) it is the “negative” or non-interest for another domain that contributes to the prediction; a positive contribution a relevant interest has only been observed in the “paper branch” for the Science interest, which seems highly plausible.

A special problem arose in two regression analyses with the criterion GPA (Branch 3-People, Branch 5-Craft) where the predictor step of intelligence reached significance but the individual predictors did not. Since none of the conventional indicators showed signs of multicollinearity full interpretability of the analyses can be assumed.

4.2 Predictors of Satisfaction

A different picture is seen when considering the “soft” criterion of job/school satisfaction: Here, intelligence was only in three of five branches significant (Food, Tech, Craft), and explained only 3 to 8% variance (in the first step, not incrementally). On the other hand, alternative abilities provided significant contributions/increments in all branches

except Tech but provided also only moderate 1 to 8% variance contributions/increments (depending on whether it was the first step or not). To determine, which alternative abilities contributed was not as easy here; in the respective step, it was the test of social-emotional competence test (a situational judgment test), which was the best of the “alternative performance tests”. But the Beta’s of this test remained significant only in one case (Branch Food) when the other (later) steps including the personality traits were included. It seems that the predictive variance of the social-emotional test was later “eaten up” by the personality traits, which makes sense when looking at the intercorrelations (see Appendix 1). The test for creative potential (essentially a divergent thinking measure) contributed in one branch (Paper), whereas the test for practical abilities never provided any independent prediction, which might also be explained by the larger redundancy of this test with the three intelligence tests (see the intercorrelations in Appendix 1).

Conscientiousness (C) facets were also regarding the satisfaction criterion the best predictor with a significant contribution in three of five branches giving 7 to 19% increments. In the “grand picture”, i.e. looking at both success criteria together C facets were almost equally predictive (6 out of 10 analyses) as compared to intelligence, which contributed in 7 out of 10 analyses. But with variance explanation of 7 to 21% increments (!) the C facets could be considered even somewhat stronger than the intelligence factors that—entered in the first step—provided between 3 and 15% variance explanation (when significant). In both cases, however, it should be mentioned that it depended on branch and criterion which intelligence factor and which C facet was predictive. While the contributions of the specific intelligence factors could be in most cases reasonably explained from the conceptual validity of the respective intelligence component, it seems much more difficult to explain why it were different C facets (dutifulness, self-discipline, ambition) that provided the respective significant prediction. But some consistency can be seen in the fact that generally the ambition facet was most frequently the best predictor (in 5 of 6 analyses). The fourth C facet “thoughtfulness” never contributed significantly.

The finding that the other big five factors give significant prediction only in some specific branches fits well the meta-analysis by Barrick et al. (2001). Not so plausible, however, is the rare contribution and low prediction from the self-efficacy variable.

Finally, the contributions of interests are incrementally significant in 7 out of 10 analyses (4 of them for the criterion satisfaction) and provided low to partially quite substantial increments: between 5 and 18%. Interests seem somewhat more important for satisfaction than for success (GPA) but it should be mentioned that of totally nine significant beta weights five were negative indicating that “non-interest” for a non-relevant (or even opposite domain, cf. the RIASEC conception) contributes positively to job/school satisfaction. From this one could even conclude that—in spite of their frequent and partially substantial contributions—interests are of rather low practical utility, as it is somewhat hard to imagine how “negative interests” could be implemented e.g. in the practice of counselling.

Also, here we had one case where a predictor step (in this case interests in People branch) reached significance but the individual predictors did not. Again, none of the

conventional indicators showed signs of multicollinearity so that full interpretability of the analyses can be assumed.

4.3 Patterns of the Prediction

In total, the variance explained was in a moderate to high range: The “hard criterion” GPA could be surprisingly explained somewhat worse (with 10 to 37%; average 25.6%) than the “soft” criterion satisfaction with school/job (23 to 35%, average 30%). However, this could be due to the nature of the tests: the larger part of the predictors was self-report tests which—when correlated with other self-reports like job/school satisfaction—can be expected to give higher correlations than with the more performance-like GPA data.

Comparing the branches most of the total predictive variances are in a range that is to be expected from previous findings, meta-analyses etc.; they mostly range between 25% and 30% but also go up to 37%, which can be considered high effect sizes. The only (somewhat surprising) exception is the GPA prediction in the Tech branch where only Step 1 / intelligence contributed and only explained 10%. Our conjecture would be that in this—strongly male dominated group—personality questionnaires but also the social-emotional judgment test are possibly filled out with less conscientiousness, something we have observed before.

Taken together our results are in line with studies showing, that vocational interest play an important role in predicting occupational outcomes (Stoll et al, 2017) especially during the early vocational career (Volodina, Nagy & Köller, 2015). The results also confirm older studies showing that different person-job-fit-criteria (success vs. satisfaction) are predicted by different predictor groups (ability, personality, interests) as found by Gellatly, Paunonen, Meyer, Jackson and Goffin (1991).

4.4 Limitations

Restrictions that might limit the generalizability of our findings are the following:

1. Samples were not small but also not large enough to allow for cross-validation. This must be the aim of future studies in order to ensure stability and replicability.
2. Some of the tests have low reliabilities in terms of the alpha-coefficient but a low alpha only means low homogeneity of the assessed construct and not necessarily that measurement quality must be bad (cf. Schweizer, 2011). We emphasize that in our view Rasch homogeneity is more important and this was ascertained here for all newly developed tests. That a low alpha must not restrain validity expectation can be seen best in the example of the verbal ability test, which contributed significantly most often here (for GPA in 4 of 5 branches) although it has an alpha of only .58!
3. The design is cross-sectional, i.e. psychometric measures and criteria have been assessed at around the same time, mostly in higher adolescent and early adult age

(mostly 15 to 26). All the tests employed here have been developed to be used for counselling purposes in 13 to 14 year-olds, i.e. when they have to make a career decision regarding their further education (apprenticeship or continuing school, cf. Dumfart, Krammer, Neubauer, 2016). The tests have been demonstrated to be reliable and valid for this younger group but their prospective validities have been demonstrated so far only in some pilot studies (e.g. Schwab, 2012; cf. also Neubauer & Opriessnig, 2014). The application of the tests that were developed for young adolescents in young adults might in some cases (especially in the ability tests) have led to ceiling effects, although the skewness values (see Table 2) do not support such a conjecture. Moreover, reliabilities did not differ between the sample tested here and our data from a sample of 13-14 year olds.

4. The assessed abilities and traits are not fully comprehensive. Especially regarding the low prediction of GPA in the Tech group (10%) and of 15% in the People branch one might ask whether other constructs might be missing, e.g. technical and manual skills, of which only the former ones were part of the test for practical abilities. On the other hand, we believe that the partially considerably higher amounts of explained variance (29 to 37% in three branches) on all other analyses except GPA prediction in the Tech branch do not support the conclusion that really important predictors might be missing. We think that our study included one of the most comprehensive test batteries including not only classical cognitive abilities, big five traits, self-efficacy, and interests (the latter in a more differentiated way than in the hitherto dominating RIASEC studies) but also alternative abilities like social-emotional competence and creativity. Especially the situational judgment test for the assessment of social-emotional competence seems to have worked well, giving incremental contributions in five of ten analyses.

In spite of these restrictions we point out that this study is one of the few attempts to predict apprenticeship success on the basis of psychometric assessments and to our knowledge it is so far, the most comprehensive one in that former attempts did not include cognitive and “alternative” abilities, personality traits and interests simultaneously.

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Appendix

Appendix 1: Bivariate correlations of all variables

	GPA	gender	age	VA	NA	SA	SEC	Crea	PSC	Th	Am	Du
gender	.095*											
age	-.01	-.06										
VA	-.25**	-.20**	.04									
NA	-.27**	.06	.02	.43**								
SA	-.18**	.00	-.07	.30**	.38**							
SEC	-.11**	-.19**	.17**	.04	.05	-.03						
Crea	-.09*	-.15**	.14**	.24**	.10*	.10*	.14**					
PSC	-.11**	.01	.05	.36**	.33**	.26**	.04	.15**				
Th	-.05	.00	.08	-.04	.01	.05	.23**	.06	.01			
Am	-.24**	.07	.15**	-.05	.05	.04	.33**	.08	.09*	.36**		
Du	-.14**	-.06	.16**	-.17**	-.10*	-.11**	.39**	.09*	-.10*	.37**	.53**	
Sd	-.20**	.03	.14**	-.13**	.00	-.08	.41**	.08*	-.05	.29**	.55**	.61**
A	-0.03	-0.3**	.10*	-0.03	-0.07	-0.06	.47**	.14**	0.01	.15**	.17**	0.21**
E	-.11**	.05	.01	.11**	.08	.05	.06	.08*	.09*	.04	.21**	.08
ES	-.08	.31**	.07	-.05	.06	-.02	-.02	.00	-.01	-.02	.16**	.06
O	-.08	-.19**	.17**	.15**	.02	.08*	.30**	.19**	.12**	.26**	.32**	.17**
SE	-.12**	.09*	.12**	.04	.14**	.08*	.17**	.07	.05	.13**	.45**	.25**
Off	.06	-.17**	.04	-.09*	-.05	-.16**	.21**	.03	-.15**	.16**	.11**	.20**
Bad	-.01	.12**	-.03	.00	.15**	-.01	.08*	.02	.00	.19**	.13**	.12**
Per	.02	-.44**	.07	-.04	-.25**	-.08	.11**	.03	-.14**	.00	.03	.10**
IT	.08	.31**	-.03	-.12**	.10*	.05	.03	-.02	.04	.10*	.05	-.02
Lead	-.03	.10*	.05	-.07	.11**	-.05	.13**	.07	-.03	.22**	.22**	.17**
Gast	-.03	-.41**	.03	.01	-.13**	-.06	.26**	.06	-.09*	.04	.04	.14**
Craft	.05	.52**	-.08	-.30**	-.06	-.01	-.09*	-.14**	-.04	.06	.14**	.05
Law	.00	-.07	-.01	.08	.11**	-.01	.14**	.10*	.03	.18**	.07	.03
Art	-.03	-.49**	.01	.11**	-.13**	.05	.12**	.09*	-.01	-.02	.01	.01
Farm	-.07	-.03	.05	-.09*	-.14**	.00	.08*	-.02	.01	.01	.11**	.07
Ass	.04	.53**	-.05	-.29**	-.05	-.01	-.07	-.08*	.00	.07	.16**	.06
Soc	.02	-.42**	.15**	.01	-.14**	-.10*	.35**	.05	-.10*	.04	.05	.16**
Sal	.03	-.10*	-.02	-.15**	-.09*	-.07	.17**	-.02	-.08*	.11**	.11**	.17**
Sci	-.03	.14**	.03	.05	.07	.10**	.04	.05	.15**	.15**	.16**	.00

Appendix 1 continued

	A	E	ES	O	SE	Off	Bad	Per	IT	Lead	Gast	Craft	Law	Art	Farm	Ass	Soc	Sal
gender																		
age																		
VA																		
NA																		
SA																		
SEC																		
Crea																		
PSC																		
Th																		
Am																		
Du																		
Sd																		
A																		
E	-0.03																	
ES	-0.03	.27**																
O	.26**	.23**	.01															
SE	0.06	.39**	.45**	.26**														
Off	.15**	.05	-.09*	.12**	.04													
Bad	-0.04	.13**	.05	.09*	.17**	.54**												
Per	.17**	.05	-.14**	.14**	-.05	.31**	-.01											
IT	-0.06	.01	.06	.02	.09*	.21**	.36**	-.14**										
Lead	0.01	.18**	.07	.12**	.21**	.53**	.76**	.03	.22**									
Gast	.23**	.04	-.17**	.25**	.00	.40**	.14**	.54**	-.06	.18**								
Craft	-.12**	.02	.19**	-.11**	.13**	-.02	.18**	-.18**	.36**	.14**	-.22**							
Law	.09*	.14**	-.02	.22**	.13**	.37**	.60**	.11**	.24**	.49**	.18**	.01						
Art	.19**	.13**	-.22**	.35**	-.03	.14**	-.08	.56**	-.14**	-.03	.50**	-.19**	.16**					
Farm	.08*	.00	.00	.12**	.04	.05	-.01	.20**	-.08*	.00	.34**	.22**	-.08*	.25**				
Ass	-.12**	.02	.18**	-.13**	.12**	.00	.18**	-.23**	.42**	.15**	-.24**	.84**	.04	-.26**	.18**			
Soc	.36**	.03	-.13**	.21**	-.02	.24**	-.05	.50**	-.10**	.02	.56**	-.16**	.17**	.46**	.18**	-.20**		
Sal	.15**	.06	-.05	.09*	.07	.64**	.42**	.30**	.17**	.41**	.45**	.04	.23**	.17**	.16**	.07	.25**	
Sci	0.01	.00	.00	.30**	.11**	.09*	.29**	.00	.43**	.22**	.06	.37**	.35**	.18**	.10**	.36**	.04	.07

Note:

GPA= Great point average; JSS= job/school satisfaction; VA = Verbal Ability; NA = Numerical Ability; SA = Spatial Ability; SEC = Social-Emotional Competence; Crea = Creativity; PSC = Practical-Scientific Competence; Th = Thoughtfulness; Am = Ambition; Du = Dutifulness; Sd = Self-discipline; A = Agreeableness; E = Extraversion; ES = Emotional Stability; O = Openness to experience; SE = Self-Efficacy; Off = Office; Bad = Business Administration; Per = Personal Service; Lead = Leadership; Gast = Gastronomy; Farm = Farming; Ass = Assembly; Soc = Social; Sal = Sales; Sci = Science.

Decision-Making Processes Among Potential Dropouts in Vocational Education and Training and Adult Learning

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Abstract

Context: Aiming at gaining knowledge about students' thoughts and actions in deciding to stay in or drop out of an educational programme, an empirical study was conducted on dropout among 18-24-year-old students in VET and basic general adult learning.

Approach: In order to pursue this aim, the study combined two sets of data: weekly student surveys and interviews with these same students. While the surveys provide a weekly snapshot of the students' thoughts regarding the probability of them continuing in the programme, their satisfaction with the educational programme as a whole, the specific lessons they attend, and the atmosphere at the school, the interviews contribute with detailed descriptions of the students' thoughts on the same matters.

Findings: Based on the students' answers over an eight-week period, it was possible to trace a graph illustrating changes in the students' attitudes. These graphs can be placed within four categories of development: the stable, the positive, the unstable, and the negative. The latter can furthermore be differentiated as reflecting a stable decline, a fluctuating decline, or a sudden decline. In the interviews, the aim was to elicit the individual students' thoughts and actions at the points when their graphs took a turn.

Conclusions: The findings show that the students' thoughts and actions concern matters both inside and outside the school. Furthermore, seemingly trivial matters in the

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students' lives are shown to have a potentially decisive influence on the students' thoughts about staying in or dropping out of a programme. These findings confirm the importance of focusing on students' decision-making processes in research on dropout. However, further research is needed to increase understanding of processes leading to decisions to drop out of education, including the qualification of methods to capture these processes.

Keywords: VET, Vocational Education and Training, Dropout, Decision-Making Process, Teetering, Young Adults, Adult Learning

Paper Type: Research Article

1 Introduction

Dropout among young adults (18-24 years old) is high: a report from CEDEFOP shows that dropout has been prioritized in EU policy since the adoption of the Lisbon strategy in 2000, with the current aim being to reduce dropout for this group to below 10% by 2020 (Cedefop, 2016). In Denmark, 20% of each youth cohort has not completed an upper secondary or VET qualification seven years after completing lower secondary education (Ekspertgruppen, 2017). These young adults constitute a particularly vulnerable group. They often struggle with traditional classroom-based learning, have difficulties in book learning; they have social and psychological problems and they have a history of dropout. This group is central in an ongoing research project on dropout among Danish 18-24-year-old students in vocational education and training (VET) and general adult education: "To stay on track. New perspectives and sustainable solutions to dropout among young adults." The article is part of this three-year project, conducted 2017-2019.

As a very widely researched issue, one may ask why there is a need for yet another research project about dropout. However, previous research has mostly studied students' reasons for dropping out, resulting in a complex tapestry of the motives for dropout. Meanwhile, there is little research concerning students' decision-making processes in relation to dropout. What do the students think and do in relation to events, leading to dropping out? The aim of the research project is to improve strategies for preventing dropout by gaining knowledge about students' thoughts and actions related to decisions to stay in or drop out of an educational programme.

In Denmark, VET for young adults include a basic 20 weeks course followed by a main course, in which the students alternate between school-based education and training and workplace-based training. Depending on the qualification level of the program, the main course has a duration of 1 to 3 years. Many of the students in this age group have to complete basic general qualifications in maths and Danish in order to enrol in VET.

The educational programmes included in the study are either basic vocational courses, situated in vocational colleges, or general, situated in adult education centres. These basic general education programmes qualify young adults for enrolment in a VET programme. Thus, students in the basic general programs are often the same kind of students one will meet in VET. The study does not include dropout in relation to workplace-based training.

2 Review of Literature

As the study deals with school-based education, the review focuses on dropout in relation to school-based education. Most of the research on dropout, including Danish research on dropout in VET (Jørgensen, 2011) has focused on the factors that contribute to an increase in the probability of young people leaving school before time. Lamb (2011) presents a conceptual model of the factors affecting dropout and completion based on such research, summarizing the research in four dimensions: 1) *Individual attributes*, which include the student's personal settings and background characteristics, such as gender, age, race, financial position, self-esteem, self-efficacy, and health; 2) *Institutional context*, which includes family and other social networks, school structure and organization, policy settings, class size and composition, student-teacher ratio, and teaching styles, attributes, and resources; 3) *Dispositions*, which include students' academic engagement, achievements, and abilities; 4) *Outcomes*, which include attainment, dropout and completion rates, and young people's decisions to complete or drop out of education (Lamb, 2011; Cournoyer & Deschenaux, 2017).

As noted by Lamb (2011), the research literature shows that dropout might be the result of complicated, interrelated, and simultaneous processes in which the various risk factors and dimensions affect each other. As described by Ferguson et al. (2005), the dropout process should be viewed as a non-linear, inter-relational, and fragmented disengagement process, characterized by paradoxes and a multiplicity of factors.

The research reveals a tendency to study dropout as the cumulative result of multiple risk factors that can be identified rather early in a person's life. As suggested by Alexander et al. (1997) and Rumberger and Rotermund (2012), dropout must be analysed as a long-term process of disengagement rather than as a binary incident or a monumental decision. Supporting the life course and long-term perspective on dropout, the research literature further proposes that dropout and the personal decision to leave school should be seen as a reaction to a longer period of academic alienation (Fine 1991; Fine and Rosenberg 1983; Brown and Rodriguez 2009) or as the culmination of a prolonged withdrawal process (Finn, 1989; Rumberger, 2004).

Hodgson (2007) proposes that dropping out of school be thought of as a longer institutional and relational process in which the school and the student co-construct the decision to leave school. He argues that dropout is unfolded by a set of experiences, interactions, and processes between the student and educators, peers, and the logics of education, leading to growing despair, resignation, hopelessness, and, in some cases, more or less tacit invitations by the school to leave. A study by Lee and Burkham (2003) shows that not only the students but also the school influence the students' cumulative process of disengagement. Archambault et al. (2009) likewise apply a processual perspective on dropout, revealing that the dropout process may begin at an earlier point than might be expected, indicating that student disengagement first be expressed psychologically rather than behaviourally. Later, the negative cognitive state evolves, and disengagement is manifested in more observable actions and behaviours. The study further shows that a decrease in motivation and school interest leads to school alienation and misbehaviour.

Based on a longitudinal study of 143 children, and on Evans and DiBenedetto's idea of a "snowballing effect", a study by Jimerson et al. (2000) shows that the decision to leave school at the age of 19 is affected by and associated with early home environment, socioeconomic status, behaviour, academic achievement, and parent involvement. The study also shows that early school experiences may affect self-esteem, establishing negative behaviours and relationships with teachers and peers "*that further propel the individuals along a pathway towards dropping out*" (Jimerson et al., 2000, p. 543).

The existing research on dropout thus documents an interrelation between individual and institutional factors. However, knowledge that is more specific and a more complex understanding are needed in order to shed light on the simultaneous interaction between the different risk factors and the students' individual thoughts and actions in a specific dropout process. To be able to describe and examine this process, the study presented in this article revisits the notion of teetering introduced by Lessard et al. (2007).

The notion of teetering has been chosen to describe how dropouts are often off balance during what Lessard et al. conceptualize as their educational journeys. Based on 80 interviews with high school dropouts, Lessard et al. argue that there seem to be forces at work both keeping the students in school and pulling them away: "*these forces contributed to the tug of war taking place between in and out-of-school contexts*" (Lessard et al., 2007, p. 32). Teetering represents the processual category between "setting the stage", which includes elements that shape the educational journey (personal history, family turmoil), and "ending the journey", which denotes the actual moment when the student leaves school, either gradually fading out or abruptly dropping out. Based on the 80 narratives, Lessard et al. categorize four strategies, i.e. patterns of thought and behaviour that the students use, more or less consciously, for "prolonging"/staying in school.

The notion of teetering captures how different patterns of thought and behaviour interact during a particular process. By focusing on the processes that lead to dropout instead of on the exact moment of dropping out, the notion of teetering illustrates the psychosocial complexity, thoughts, actions, and balancing acts that characterize this process. In order to gain knowledge about the students' thoughts and actions in deciding whether to stay in or drop out of an educational programme, this study combines the processual view on dropout with the notion of teetering.

The research in the field of decision-making has mainly focused on career decision-making, usually by categorizing an individual's "type" or "style" and its effect on a career decision-making process (Harren, 1979; Phillips & Paziienza, 1988; Blustein, 1987; Phillips et al., 1984). As noted by Mau (2000), research findings in the field of career-decision making are inconsistent, indicating that the effectiveness of what is often assumed to be the most effective decision-making style, the rational, may be situational and dependent on personal factors and characteristics of decisional tasks during the process (Mau, 2000). There is a need for research on the decision-making processes leading to either educational dropout or retention that focuses on the students' thoughts and actions during periods when they are in doubt as to whether they should continue or not with a particular educational programme.

The process of decision-making is important in understanding and describing the student's thoughts and actions in a process leading to staying in or dropping out of an educational programme. As described by Hunt et al. (1989), human decisions are often more judgmental than mechanical, i.e. more unstructured cognitive processes than rational processes. Inspired by Hunt et al., it is furthermore possible to characterize decision-making processes as cognitive processes by which an individual develops models of "reality" to develop, create, and organize action.

Harren defines decision-making style as an individual's characteristic mode of receiving and responding to certain tasks¹ during the decision-making process and, in general, the way a person goes about making decisions (Harren, 1979). Harren identified a typology of three styles, which can be placed on a continuum. This illustrates the degree to which an individual takes responsibility for the process and to which this individual uses logic (the more rational), emotions and feelings (the more intuitive), or expectations of authorities and peers (the more dependent) as the primary approach in thoughts and actions during the decision-making process (Harren, 1979).

To transcend the focus on a single, rigorous approach to decision-making styles, Gati et al. (2010) propose a multidimensional model for characterizing decision-making, referring to decision-making profiles instead of styles, indicating that decision-making is a "*complex, multidimensional construct rather than a single dominant trait*" (Gati et al., 2010, p. 278).

In the project, "To stay on track. New perspectives and sustainable solutions to dropout among young adults." the focus is solely on the students' decision-making processes and not so much on the result of these processes. Inspired by the above mentioned explorations of decision-making processes, the aim of this article is to present the preliminary findings from the project, regarding the students' thoughts, feelings, and actions during periods of increased risk of dropping out. That is, periods during young adults' education when they become more uncertain of their motivation to continue within a particular programme.

With the aim of obtaining knowledge about students' thoughts and actions during periods of heightened risk in the educational programme, the article addresses the following four research questions:

1. How do students' motivation to continue in an educational programme develop over time?
2. What leads students to change their minds about staying or dropping out?
3. What do students think, feel, and do during periods in which they alter their perceptions of staying or dropping out of a programme?
4. How do students typically decide whether they want to continue their current educational programme?

¹Inspired by Harren's (1979) definition of "tasks", examples of "tasks" in a dropout or retention context could be engaging in social activities', making friends (getting a boyfriend/girlfriend)', and getting feedback'. The tasks include those elements and situations that concern the particular decision-making process: developing autonomy, interpersonal maturity, and a sense of purpose.

3 Method

Data consists of surveys and interviews conducted with 31 students during the autumn of 2017.

3.1 Student Surveys

The purpose of the student-surveys was to study how their motivation to continue in the specific educational programme develops over time (research question 1). Assuming that their satisfaction with the programme in general, the lessons, and the atmosphere at the school has an impact on their motivation to continue, a multidimensional construct including the following four questions was used:

1. How satisfied are you with this programme?
2. How satisfied are you with the lessons (the teaching)?
3. How satisfied are you with the atmosphere at the school?
4. How strong is your motivation to continue in this programme?

Every week during the autumn term, a total of 15 weeks, the students were asked to answer the four questions according to a Likert scale ranging from 1-7 (1 = the lowest and 7 = the highest). Repeating the survey over the whole term enabled an emerging pattern of developments in the students' attitudes.

At the time of the initial survey, the 31 interviewed students were enrolled in programmes at 14 schools (six vocational colleges and eight adult general education centres). The 31 students were selected by the schools, the criterion being that the schools - based on interviews conducted with students at the beginning of the term - believed these students to be at risk of dropping out. The reason for focusing on potential dropouts was that the project aims at providing a varied picture of the group of students at risk of dropping out.

This article presents the results of an analysis of graphs plotting students' responses to the surveys across an eight-week period. Almost all students had answered the survey every week, with only a few skipping a week due to illness. Based on their responses, four graphs were plotted for each student reflecting the student's answers to each of the four questions above.

The graphs were analysed in order to categorize different types of development. The analysis focused on the fourth research question, "How strong is your motivation to continue in this programme", paying attention to both the degree of fluctuation (between 1 and 7 on the Likert scale) and the direction of the graphs (ascending or descending).

The graphs showing the students' answers to the remaining questions 1-3 were included in the analysis in two ways. Firstly, the coherence was analysed between the students' graphs showing their answers to question 4 and their answers to questions 1-3. Secondly, the interviews with the students used their answers to all four questions as a jumping-off point.

3.2 Student Interviews

The purpose of the interviews with the 31 students was to elicit the students' narratives about their thoughts, feelings, and actions at the points when the graphs changed.

The interviews were semi-structured and took their point of departure in the individual student's graphs depicting the student's answers to the four questions in the eight-week-period. Looking at the development of student's graphs, the researcher and the student talked about the students' thoughts, feelings, and actions, following two lines of questioning reflecting the research questions above:

1. What happened at the time when you answered differently, i.e. when the graph or graphs changed? This included the students' explanations of the graphs showing answers to questions 1-3 in the survey, as well as referencing to other specific events at school or events occurring outside school, e.g. mental health or personal problems. (Research question 2 above).
2. What did you think, feel and do at the time when the graph changed? (research question 3 above).

Each interview was recorded, had a duration of 1/2 - 3/4 of an hour and transcribed.

4 Results

The results are based on an analysis of the students' answers to question no. 4: "How strong is your motivation to continue in this programme?"; an analysis of the coherence between the students' answers to question 4 and questions 1-3; and finally an analysis of the students' narratives about the events, thoughts, and actions related to the graphs showing an unstable or negative developmental tendency (see below).

4.1 Four Categories of Development

In relation to research question 1 and based on an analysis of question 4: "How strong is your motivation to continue in this programme?" four categories of development have been defined:

1. The stable development (11 students)
2. The positive development (4 students)
3. The unstable development (4 students)
4. The negative development (12 students)

The Stable Development is illustrated by graphs of 11 students. These have been defined as showing no development when comparing the initial position with the final position, values fluctuating slightly around the mean value. Graphs of half of these students (6) are positioned at a relatively high level during the whole period, oscillating between

5 and 7 on the scale. These students want to continue their current programme no matter what. Graphs of the remaining students (5) are positioned in the middle of the scale, oscillating between 2 and 5 on the 7 point scale.

The positive development is illustrated by the graphs of four student. Two students move from being 'certain' to 'very certain' that they will continue in their current programme. The other two move from being 'not certain' to 'reasonably certain'.

The unstable development includes the graphs of four students. As was the case for the graphs illustrating a stable development, the analysis of these four graphs shows no systematic change. The graphs show considerable fluctuations, with values oscillating between 1 and 7; however, values at the beginning and end of the period remain the same.

The negative development is illustrated by the graphs of 12 students. Most of these students (10) initially state a high probability of continuing in their current programme. More than half of the students (7) become increasingly negative, eventually at the end of the eight-week-period stating their likelihood of continuing in the programme at level 3 or 4. Three students move from being very certain (6-7) to very uncertain (1) that they will continue. Two students, who initially assessed their probability of continuing in their current programme at levels 4 or 5, become less certain during the survey period.

Summing up, for half of the 31 students their ratings during the survey period do not reflect a consistent pattern of change. More than one third of the students (12 out of 31 students) go through a negative development', becoming less certain that they will continue in their current programme. Finally, a few of the students (4) seem to undergo a positive development, becoming more certain that they will continue in their current programme.

4.2 Students' Motivation to Continue in the Programme and their Satisfaction with Programmes, Lessons and Atmosphere

In relation to research question 2 and 3 above, the data show coherence between the students' responses regarding how motivated they are for continuing in their current programme (question 4) and their satisfaction with the programme, lessons, and the atmosphere at the school (questions 1-3). The graphs plotting responses to questions 1-3 for students whose responses to question 4 show a 'stable' or a 'positive' development may show certain fluctuations. For example, a student expresses dissatisfaction with the lessons or with the atmosphere at the school in one of the weekly surveys, perhaps due to a particular negative experience. However, in most cases these fluctuations do not affect the students' motivation to continue their studies: the graph for question 4 remains stable. However, examples of the opposite can also be found; i.e. motivation to continue in the programme' follows the same graph as, for example, satisfaction with the atmosphere at the school'.

With regard to the four students with an 'unstable development', the graphs for each of the four questions oscillate considerably, but these changes are not necessarily consistent across the four graphs. One week the student can express dissatisfaction with the lessons, another week with the atmosphere at the school. In relation to research question 2 above,

the results show that it is difficult to pinpoint what makes the students' graphs oscillate.

For the 12 students categorized as following a negative development', the graphs plotting their answers to questions 1-3 generally correlate with the graph showing the answers to question 4, indicating that, whereas the students following a stable development' are relatively unaffected by events at school, the students with unstable' or negative' developments are sensitive towards such events. The students seem to feel that everything develops in a negative direction. However, among the students in this category one also finds examples showing that their satisfaction with the atmosphere at the school or with the lessons does not directly influence their motivation to continue in their current programme. It is therefore not possible to determine which of the three factors has the greatest impact on the students' motivation to continue their studies.

Answers to questions 1-3 show that responses to the three questions follow a similar tendency. However, examples of the opposite tendency can also be found, with students expressing significantly different degrees of satisfaction regarding the three factors.

Finally, the analysis of the graphs shows that the students perceive the same situations differently. In the data, one can find examples of both major and minor variations in the individual student's weekly survey responses. It can be argued that this reflects differing degrees of sensitivity to changes at school or in the lessons. When comparing responses from students in the same class at the same school, the graphs differ substantially. As such, students can perceive the same class and the same teaching very differently.

4.3 The Unstable and Negative Graphs Exemplified from Student Interviews

Among the 31 student interviews, the article focuses on the students seemingly most likely to drop out, i.e. the students belonging to the categories the unstable development' (4 students) and the negative development' (12 students).

In the following presentation of the results from the student interviews, we compare the graphs to the students' narratives regarding what happened at the time when the graph changed and what they thought, felt and did at that time.

4.4 The Unstable Development Exemplified

The students in this category oscillate significantly over time in their answers to all four questions. They typically have problems both inside and outside school. School is to some extent perceived as a refuge when the external problems dominate. This can somewhat explain why the students stay in the programme.

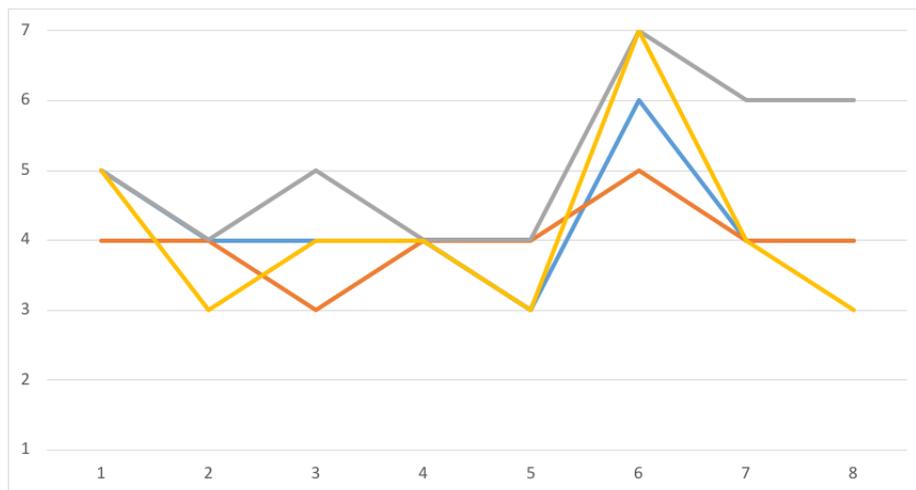


Figure 1: Mark, male student. Blue: satisfaction with the programme; orange: satisfaction with the lessons, grey: satisfaction with the atmosphere; yellow: motivation to continue in the programme.

The strongly oscillating graph characterizes students who are highly sensitive towards quite small changes, such as Mark, 22 years old (figure 1), who is studying general subjects in order to enrol in an as yet undefined VET programme. Mark does not like maths lessons: “We have maths on Monday and I answered the survey on a Monday, so I was just in a bad mood”. Regarding his thoughts and actions in relation to the oscillating graph, he says: “I have good and bad days, often related to whether I can keep up academically; in particular with maths, which stresses me and pressures me emotionally. I might also have had a bad morning, or private problems, which depresses me; sometimes it is just trivial things. However, then I start to bunk off; I don’t bother; I feel I’m wasting my time. I think that this doesn’t make sense to me and I find something else to do. I feel blank.”

The social atmosphere at school is crucial for Mark’s satisfaction with the programme and his motivation for going to school and continuing in the programme, as can be seen in the sixth week, where the grey, the blue and the yellow graphs take the same upward direction. “I always think twice before just dropping out; I really like to be with my classmates.” However, Mark is also influenced by other issues referring to his personality: “I want to be in control of my own life, and I need to obtain the qualifications”. Mark is satisfied with his classmates, the teachers, and the guidance counsellors, and he takes action by discussing his situation with a guidance counsellor. Subjects like maths may pull him in the direction of dropping out; the relation to the classmates and the guidance counsellor pulls him in the opposite direction to stay in the programme. The teetering process for this student shows, on the one hand, that he is easily affected by trivial things’ and that he is at risk of dropping out. On the other hand, he knows that he is in charge of his own life and that he is responsible for completing the programme. Mark

completes the programme.

Another student in this category of four students is Jens, who is training for a qualification in a business programme. He wants to enrol in a programme for hairdressers, but needs a commercial qualification to establish and run his own salon. Like Mark, Jens encounters problems in his private life, uses school as a refuge, and has difficulties concentrating on the academic work because he thinks too much about his private problems and considers dropping out. However, he is also aware that he needs to complete the programme and that doing so is his own responsibility. Jens completes the programme.

4.5 The Negative Development Exemplified

The category 'negative development' includes 12 students whose motivation to continue their studies shows a negative development. The category can be divided into three sub-categories: 'stable decline', 'fluctuating decline', or 'sudden decline'. Below are examples of these categories.

Students with a *stable decline* generally struggle with problems both inside and outside school and suffer from physical or, most often, psychological problems. At the beginning of the programme, they are optimistic that they will continue. However, after a couple of weeks, the graph starts to show a decline.

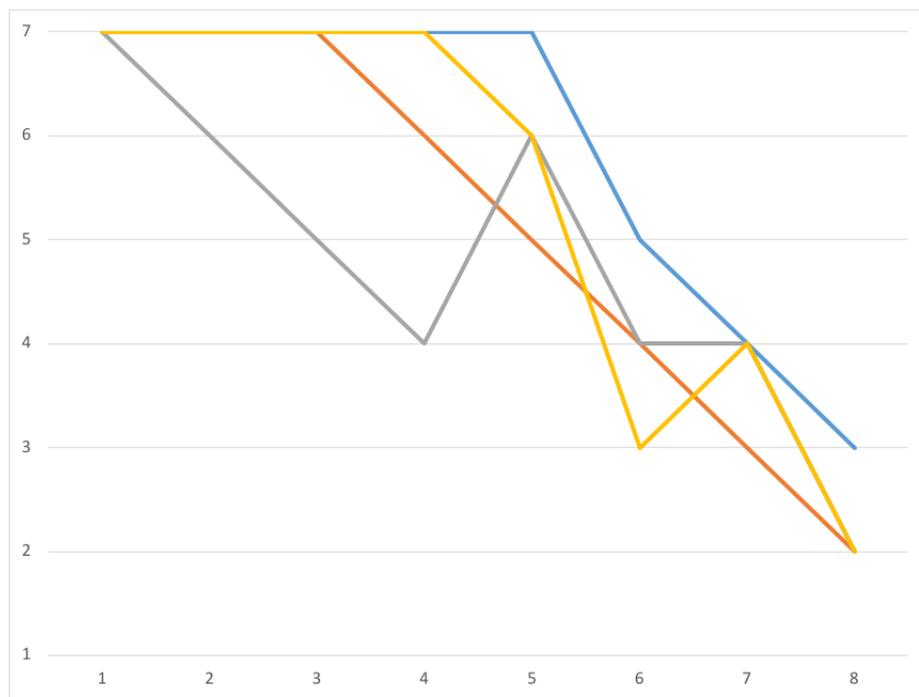


Figure 2: Mona, female student. Blue: satisfaction with the programme; orange: satisfaction with the lessons, grey: satisfaction with the atmosphere; yellow: motivation to continue in the programme.

Mona (figure 2) is 21 years old, has dropped out of several VET programmes, and is now studying a number of general subjects in order to enrol in a yet undefined VET-programme. Very early in the interview, she says that it is very important for her that the school is situated far away from her home. Wanting a new start, she does not want to meet people she knows. However, asked about the oscillating and downwardly sloping graph, she explains that in the fourth week she got into trouble with another girl: “I just did not want to be at school with that girl. I was away for two weeks, because my grandmother died, and when I returned I was told that she (the classmate) never wants to talk to me again.” When asked about why the orange graph (satisfaction with the lessons) declines in the fifth week from 7 to 5, the explanation shows that she is involved in trouble among the girls in the class: “Someone from the class had told the supervisors that I and two other girls disrupt the lessons. I was called for an interview and I just thought it was so creepy and that I would never do a thing like that (inform against somebody) to the others (classmates).”

Furthermore, Mona is easily influenced by her academic performance, for example, when explaining why the yellow graph declined in the fourth week and rose again in the fifth week: “In the fourth week, I failed an assignment in the English class and in the fifth week, I had handed in a new version, so I was happy again.”

Contrary to Mark, Mona does not take the initiative to talk with a teacher or a counsellor about her situation. She characterizes herself as a tough person who does not put up with anything and she mostly blames her surroundings for her social problems. Due to her toughness, her graph fluctuates a little; however, she gradually loses the motivation to attend school. Mona eventually drops out.

Students with a *fluctuating decline* are sensitive towards events and experiences both inside and outside school. These can be positive, but are mostly negative. A 22-year-old female student, Lila (figure 3), has previously dropped out of several programmes and is now training for a qualification as a retail assistant. Lila suffers from psychological problems and in the third week, when the yellow graph declines, Lila explains that she felt depressed: she could not get out of bed, she had problems falling asleep at night, and she began to doubt whether she would be able to complete the programme. She asked her doctor to adjust her medication, falling ill and staying at home for a few days.

Lila is influenced by the atmosphere in the class; the grey graph drops from 5 to 3 in the third week. She explains: “We don’t speak to each other nicely in our class; classmates are rude to each other.” She is also influenced by the lessons: in the third week, the orange graph declines from 7 to 5 and follows the blue graph in the fifth week, with the rating falling to 4. Lila explains: “We had too much teaching at the blackboard. A lot of us learn much better, when we have the things in our hands. One of my classmates and I were allowed to work outside the classroom and that helped me; I was back on track”.

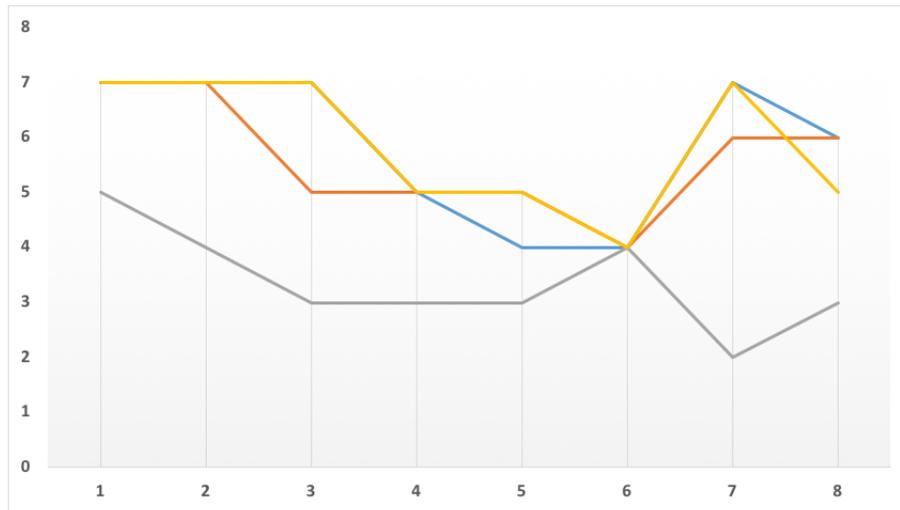


Figure 3: Lila, female student. Blue: satisfaction with the programme; orange: satisfaction with the lessons, grey: satisfaction with the atmosphere; yellow: motivation to continue in the programme.

Thus, Lila's oscillating graphs reflect a sensitivity to things like changes in teaching methods, meaning that the overall downward trend nonetheless shows fluctuations: having dropped from 7 to 4 during the first six weeks, the yellow graph climbs to 7 again in the seventh week before dropping to 5 in the eighth week. In Lila's case, psychological problems combine with her dissatisfaction and frustration regarding the classroom atmosphere and the lessons. She withdraws when she needs to consider her situation; she does not ask for help; she may listen to others' opinions, but she mostly listens to her gut feelings. At the time of writing the article, Lila has not dropped out of the programme.

Finally, a *sudden decline* means that the student's engagement appears stable for a period before suddenly declining significantly. Even though the students in this category perform quite well academically, they are unsure of themselves and have low self-efficacy, which may be due to a mental disorder. Like the other students with negative graphs, they do not take initiatives that might support them in continuing in their current programme.

Katja (figure 4) is an 18-year-old girl who is training for a qualification as a painter and decorator. She lives in accommodation provided by the school and is performing well at school, the teachers having no doubt that she will be able to pass her exams. She has previously dropped out of another VET programme at the same school, where she neither had problems of attainment. She also thrives socially and feels at ease in the class. As the yellow graph (motivation to continue in the programme) shows, she is initially confident that she will continue; however, the graph already falls abruptly to 4 in the second week, rising gradually during the following weeks before suddenly falling to 1 in the eighth week. Asked about this abrupt drop, she says that she suddenly decided to drop out; however, she finds it difficult to explain why: "I thought about it a lot;

but I did not have the motivation to go to school. Furthermore, I was sure that I would not be able to pass the exams. Rather stop than fail the exam”. She wants to avoid a defeat, to play it safe and be the one who withdraws before she is told to do so.

Katja also argues for her decision by blaming the type of tasks that she would have to perform as a painter and decorator: “Sandpapering, standing on a ladder in windy weather; it’s just not me. I want to work with wallpaper, colours, and patterns”. She had the same kind of reasons for dropping out of the previous VET programme. Her explanations for dropping out during the interview do not entirely seem to fit the reality. She is good at schoolwork and according to her teachers, she would be able to complete the programme. Still, it seems as if she is easily out of the saddle, convincing herself that the right decision is to drop out. Her personal history may shed light on her thoughts, feelings and actions. She has suffered from parental neglect, as both her parents are drug addicts. She has difficulties making commitments, fearing that she will be let down. Furthermore, her problems with getting up in the morning, partly due to various physical and psychological conditions, result in a high rate of absenteeism. She tells that she takes anti-depressants and sleeps a lot. Katja drops out of the programme convinced that this is a wise decision. At the time of dropping out, she already knows which VET programme she wants to enrol in instead.

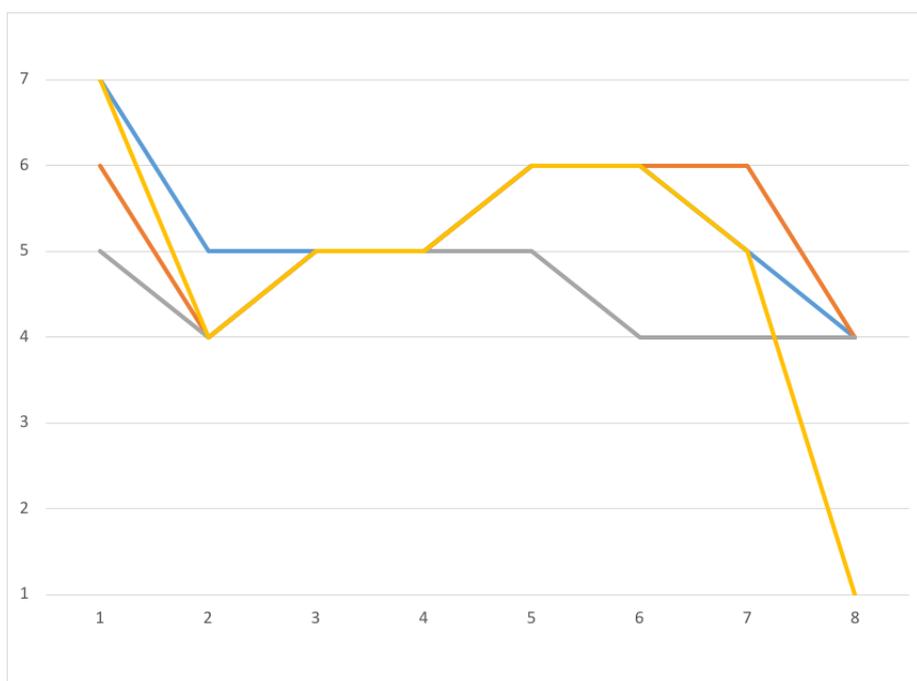


Figure 4: Katja, female student, Blue: satisfaction with the programme; orange: satisfaction with the lessons, grey: satisfaction with the atmosphere; yellow: motivation to continue in the programme.

In relation to research questions 3 and 4 above, the four examples presented here exemplify different types of development and decision making processes. The central distinction between the unstable development' and the three types of negative developments is that students with an unstable development', despite feeling that they cannot cope with the academic challenges or the classroom environment, believe that they must continue their studies. They feel at ease socially, which helps them maintain a positive view of the programme, despite the challenges.

Students with one of the three types of negative developments provide explanations for changes that are largely similar to the students with an unstable development': they have experienced a setback academically or feel socially uncomfortable at the school. However, the students with a negative development' are more vulnerable, with their problems at school often combining with various psychological and social problems. Consequently, the events at school have a negative impact on the students' motivation to continue in the current programme. Furthermore, the students with a negative development' are disinclined to seek help.

5 Discussion

The study supports the findings of previous research: students' thoughts and actions when deciding whether to stay in or drop out of their current educational programme can be described as a fragmented disengagement process, characterized by paradoxes and a multiplicity of factors (Ferguson et al., 2005). Dropout must be analysed as a long-term process of disengagement, not as a binary incident or monumental decision (Alexander et al., 1997; Rumberger & Rotermund, 2012). The decision to leave school should be understood as a reaction to a prolonged period of academic alienation (Fine, 1991; Fine & Rosenberg, 1983; Brown & Rodriguez, 2009).

However, by combining a survey over a period of 15-week with in depth interviews the data collection methods in "To stay on track. New perspectives and sustainable solutions to dropout among young adults" enable an illustration of the contents and fluctuations of the decision-making processes. This includes the individual student's considerations and perceptions of his or her current situation in- and outside school providing knowledge about the interrelation of the various factors included in the decision-making processes. Thus, the data collection method not only provides information about events that influence the students' decisions but also about the decision-making processes.

The findings show that the decision-making processes in relation to staying in or dropping out of an educational programme differ considerably among students. Some cases show a stable development', in which things are gradually brought to a head. Other cases show turbulent developments, with students oscillating between wanting to drop out and wanting to continue. Finally, some developments are abrupt, with what appears a relatively stable development' suddenly leading to a decision to drop out. In relation to vocational education and training, the results call for a genuine interest in the individual student's thoughts, feelings and coping strategies.

The findings show that the students are sensitive to occurrences at school, even those

that might be perceived as trivial. As Mark says, for example: "We have maths on Monday and I answered the survey on a Monday, so I was just in a bad mood." However, students differ in their ability to overcome such trivial matters, meaning that for some students (those with a negative development'), such matters are not trivial at all; they instead become the straw that breaks the camel's back at least in the students' narratives. In terms of discussing how to prevent dropout in VET, it is important to be aware that although students with a negative development' provide largely the same (official) explanations for changes as students with an unstable development', the changes have more severe consequences for students with a negative development'.

Comparing the findings to Harren's typology of three styles of decision-making process - the more rational', the more intuitive', and the more dependent' (Harren, 1979) - it can be argued that many of the students' deliberations seem to be more intuitive than rational. Furthermore, many students in VET will have difficulties in explicating their thoughts and feelings, making it difficult to pinpoint crucial times in the students' decision-making processes. Further studies should include testing methods to elicit the students' feelings in relation to staying in or dropping out of education.

Finally, the study points to the importance of seeking help to find a constructive solution to one's problems. Some students will take the initiative to seek help; in other cases, the teacher or guidance counsellor will have to take the initiative to turn to the student. In order to do so the teachers and guidance counsellor have to be sensitive towards non-verbal indications of change in well-being among the students.

Two limitations should be mentioned in relation to the validity of the study's empirical data. The first concerns whether the fluctuations in the scores actually reflect the students' feelings and thoughts. As mentioned above, many of the occurrences mentioned seem (to the researchers) to be trivial matters, and the students might be exaggerating when answering the survey. However, the interviews serve to validate the scores in the survey in the sense that the students confirm that their thoughts and feelings corresponded to their scores. In addition none of the participants in the survey gives the exact same score throughout the surveys. This can be regarded as a test of validity in the sense that it suggests that, every week, the individual student consciously makes up his/ her mind about how to answer to each of the four questions.

The second limitation is that the study only covers a limited period; furthermore, a period during which the students are still enrolled in their chosen programme. This poses the question: does the study actually deal with dropouts? On the other hand, it can be argued that it is important in relation to preventing dropout that the students' scores reflect their experiences at the time when they occurred rather than their rationalizations after completing the programme or dropping out. As such, it can be argued that the students' answers provide a more authentic picture of their experiences than would be provided by them reminiscing about their time at school. Furthermore, the study highlights the importance of detecting and addressing students' problems at an early stage.

In relation to the issue of dropout in VET, the study points to the complexity of the students' decision-making processes including their thoughts, feelings, and actions, which can guide action in relation to preventing drop out. However, further research

should aim at developing methods for eliciting the students' thoughts and feelings and their styles of decision-making processes.

6 Conclusion

Based on 31 students' weekly responses to the question of their motivation to continue their studies, supplemented by three questions concerning their perception of the programme, the lessons, and the atmosphere at the school, we have conducted interviews exploring these students' thoughts and actions in relation to events that have influenced their responses.

In line with previous research, the students' deliberations regarding whether to drop out or stay in their current programme can be described as a process influenced by a number of issues related to the school, current educational programme and to the students' lives outside school.

The results show that the students' responses follow different developments, some even and stable others sharp and abrupt, and yet others oscillating and turbulent. Knowledge about these developmental tendencies has practical benefits for preventing dropout in VET, enabling teachers, counsellors, or others involved in the students' educational progress to intervene at crucial moments during their education.

However, the results point to a need for more knowledge about the effects of the students' emotional processes in relation to their decisions as to whether or not to drop out, including developing methods to capture these processes.

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Critical Practice Study of Nursing Evaluated by Teachers

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Abstract

Purpose: Competent nursing care is essential to positive patient outcomes and quality patient care. Graduate nurses begin practice as novices in knowledge and experience often entering an environment where patients have several disease processes complicating their care. A strong foundation of educational competencies prior to entering practice is vital for the development and growth of graduate nurses into the role of RN. The purpose of this study was to examine the use of the Nurse Competence Scale among nursing faculty.

Method: Nursing faculty were surveyed to determine which competencies were a priority in nursing practice. The Nurse Competence Scale was used to identify and categorize nurse competences. Brenners novice to expert theoretical framework was used to apply findings to curricular programs. IRB approval was granted from each educational institution. SPSS statistical analysis was used to analyze survey results.

Results: Among the categories of the Nurse Competence Scale, nursing faculty identified Acting appropriately in life-threatening situations in the Managing Situations section as most important to practice. In the category of Helping, Planning patient care according to individual needs was identified as most important. Additionally the nursing faculty surveyed rated Contributing to further development of multidisciplinary clinical paths in the Therapeutic Interventions category as the lowest.

Conclusion: This study contributes to the discussion on nursing competence. Priorities for nursing faculty aligned with register nurses in practice. This study helps pair nursing education with practice in several ways including aligning current practice with

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education. Nurse Educators may use these findings to help join curricular outcomes with practice. Evaluating each item on the Nurse Competence Scale using the critical to practice scale provides insight to the necessary skills and knowledge needed to be competent in nursing. In addition the results may be compared to current practice guidelines to ensure best practice. Further research linking education and practice using nursing competence is needed.

Keywords: VET, Vocational Education and Training, Nursing Competence, Nursing Education, Practice Education Gap, International Nursing

1 Introduction

The United States utilizes multiple ways of establishing and evaluating competence in nursing. Professional organizations, accreditation agencies, and government agencies have published standards and criteria identified as essential to nursing (Accreditation Commission for Nursing Education, 2014; American Nurses Association, 2015; National League for Nursing, 2016; Quality and Safety Education for Nurses Institute, 2014). Initially these standards start in nursing programs and continue into practice. While nursing program guidelines reflect curriculum, student and teacher resources, financial resources, and program outcomes, practice standards include ethical decision-making, patient outcomes, and quality of practice (American Nurses Association, 2015).

Despite having these standards in place, nursing managers and preceptors indicate graduate nurses are not competent to enter practice (Lindfors & Junttila, 2014). In a 2009 study by Hickey (2009), preceptors reported that newly graduated nurses were weak in the following areas: (a) psychomotor skills, (b) assessment skills, (c) critical thinking, (d) time management, (e) communication, and (f) teamwork. Other studies support Hickey's findings, indicating that new graduates lacked organizational, time management and communication skills (Dyess & Sherman, 2009; Lindfors & Junttila, 2014); newly licensed nurses failed to recognize life-threatening complications (NCSBN, 2009) and did not demonstrate competence (Lima, Newall, Kinney, Jordan, & Hamilton, 2014). This underscores the transition of a nurse from novice to expert.

Identifying nursing competencies would help transition newly graduated nurses to practice. Identifying competencies to focus on in pre-licensure and ongoing training activities would focus the knowledge base, helping to identify important concepts. By focusing on these competences in nursing school, the graduate nurse may be able to start build better understanding and competence prior to entering practice. This will aid in the knowledge to expert, a journey all nurses travel through as they become expert clinicians. In addition sharing these competencies with students will help the process of extracting and dismissing extraneous information to focus on.

The Nurse Competence Scale, designed by Meretoja (Meretoja, Isoaho, & Leino-Kilpi, 2004) identified overall competencies nurses used in practice. Using interrater reliability and peer review, the Nurse competence scale has been administered in many different countries, including countries in Europe and the Middle East, as well as Australia

(Meretoja, Isoaho, & Leino-Kilpi, 2004; O’Leary, 2012; Wangensteen, Johansson, Bjorkstrom, & Nordström, 2012) with the goal of assessing the overall competence of practicing nurses. Previous studies have shown the NCS to have better reliability than other tools. Applying the NCS to graduate nurses, rather than practice nurses, may help build the competencies needed to be successful in the role of a nurse.

The purpose of this study was to investigate what are critical nursing skills evaluated by nursing teachers. This study is a brief version of the authors completed doctoral thesis. The study searched the answers to the following research questions:

- 1 What skills on the Nurse Competence Scale (NCS) were most frequently used by nursing teachers?
- 2 What skills on the NCS were rated by teachers as most critical for practice?

2 Background and Literature Review

It has previously been shown nursing competence is related to safe quality nursing care (Aiken, Clarke, Cheung, Slone, & Silber, 2003). For the purposes of this paper competence is defined as “*The ability to perform a task with desirable outcomes under the varied circumstances of the real world*” (Benner, 2001, p. 302). The ability to critically think is essential in nursing in order to solve problems, implement interventions, and evaluate the effectiveness of those interventions (Tanner, 2006). Performance of essential skills is fundamental to competence. This outcome based approach is often appraised in the accreditation process and is evident in professional standards (ACEN, 2014; ANA, 2015; NLN, 2016). The driving forces behind evidence-based practice in nursing are often outcome based (ANA, 2015; NLN, 2013; QSEN Institute, 2014).

If an individual is evaluated to be competent, one is often described as having superior job performance (McMullan et al., 2003). Mustard (2002) also identified competence as the performance of skills needed to meet established standards of care. Competence does not end at the ability to perform skills but also encompasses the knowing how and when to perform the needed skills. Nurses must be able to apply essential skills to different situations as well as anticipate potential complications. Further studies identify competence as skills and actions, indicating it is not enough to know how; one must also know when to act (Dunn et al., 2000).

The knowledge, skills and behaviors that encompass competency are developed in nursing education programs and built upon throughout an individual’s nursing career. It is essential that these basic competencies are established prior to entering the workforce in order to ensure safe, quality care for the public (NCSBN, 2014). However the discord between workforce and academic practice has been a long-standing issue.

In further studying competence, Eraut and du Boulay (1999) found a distinction between the expectation of an employer and the characteristics of an individual. Evidence of this is demonstrated in the different expectations of graduate nurses, academic professionals and employers. This creates a gap in the expected knowledge and skills levels for

new graduates as they make the transition from academic nurse to workforce professional.

Theoretical Basis

Benner's (1984) theory, From Novice to Expert, served as the theoretical framework for this study. Benner's theory describes the cognitive shifts and subsequent nursing interventions in new graduate nurses as well as the professional nurses' growth in competence as his or her career progresses. According to Benner's theory, the graduate nurse, or novice, moves through five stages of development that culminate at the level of expert who, by education and experience, can automatically eliminate extraneous information to focus on holistic patient care with ease. These stages consist of the following: (1) novice, (2) advanced beginner, (3) competence, (4) proficient, and (5) expert (Benner, 1984). Each individual nurse passes through these stages at their own pace and, therefore, there is no specified amount of time spent in each stage.

Benner's model involves cognitive and psychomotor skills requiring the nurse to possess abstract thinking and apply clinical judgment skills (Benner, 2001). Each stage of the Benner Model, from novice to expert, possesses its own unique qualities and characteristics that demonstrate a continuum of learning and development. For the nurse newly working in the field, responding to diverse and often demanding situations builds competence and fosters progression through the stages of from Novice to Expert.

Nurse Competence Scale

Brenner's Novice to Expert theory was used in the development of the Nurse Competence Scale. Panels of experts identified duties related to the role of the professional nurse. These role related responsibilities were compared and narrowed down to 75.

The Nurse Competence Scale contains 75 questions divided into seven categories consisting of Helping role, Diagnostic Functions, Teaching/coaching, Managing situations, Ensuring quality, Therapeutic interventions, and Work role. Although each category is related to nursing competence, the categories help further detail qualities of nursing competence. All categories are weighted equally and once completed, an overall competence score is determined. The belief is the nurse receiving a higher competence score has progressed further on the Novice to Expert continuum than a nurse who has a lower competence score.

3 Research Procedures

3.1 Design

A mixed method approach was used, including quantitative analysis of survey questions and interviews with participants, to examine nursing teacher views on items critical to practice on the Nurse Competence Scale. Quantitative results are reported in this paper. A survey link was sent out to nursing teachers via email. Copyright and IRB approval was granted for the study.

To ensure the protection of human subjects, Institutional Review Board approval was sought. All participants were sent an email with a description of the study and a link

to the survey. Prior to completing the survey all participants were given a consent page, once agreeing to participate in the study, the participant was linked to the survey. The researcher did not disclose data to participants; once surveys were completed, participants ($n=20$) were unable to view overall survey results. Statistical analysis was conducted using the SPSS software package.

3.2 Sample

A purposeful sample of nursing teachers ($n=20$) at a state college in Florida; state and community colleges offer associate degree programs in nursing, a nationally accepted educational pathway into the workforce in the United States. The study required an expert panel to examine the content on the NCS. Nursing teachers were selected as the sample population due to their years of experience in nursing and advanced education and depended on subject willingness to participate in the study. Faculty possess knowledge and experience in their respected fields that leads to a deep understanding of the role of the nurse. Recent teaching experience prepares faculty to critically examine fundamental aspects of nursing pertinent to basic competencies. This expertise gives faculty the unique capacity to offer perspectives on nursing research as well as the skills and experience needed to be successful in the workforce.

The selected state college in central Florida is accredited by the Accreditation Commission for Education in Nursing (ACEN). Full-time faculty members were recruited from an associate degree program meeting the criteria established by ACEN.

No participants meeting criteria were excluded based on demographic factors. Demographically, the samples consisted primarily of females (95%) and were Caucasian (75%); Asian (5%) and Hispanic (20%) (M. Morgan, personal communication, August 19, 2016).

3.3 Instrument

The Nurse Competence Scale (NCS) was designed as a self-measurement tool to evaluate nursing competence. Originally developed in Finland, the NCS has been used in over 25 different countries (Meretoja, Isoaho, & Leino-Kilpi, 2004; O'Leary, 2012; Wangenstein, Johansson, Bjorkstrom, & Nordström, 2012).

The NCS consists of 75 statements divided into seven overarching categories that include: (1) the helping role, (2) teaching-coaching, (3) diagnostic function, (4) managing situations, (5) therapeutic interventions, (6) ensuring quality, and (7) work role.

The critical-to-practice, scale was included in the survey sent to nursing teachers. The critical-to-practice scale focuses on participants' opinions on the importance of each item on the NCS. This scale ranges from one (indicating the item is not critical to nursing practice), two (indicating the item is somewhat critical to practice), and three (indicating the item is very critical to practice).

4 Results

The highest rated item on the Critical to Practice Scale was *Acting appropriately in life-threatening situations* (M=3.00, SD=0.00, Table 1). The lowest rated item was *Contributing to further development of multidisciplinary clinical paths* (M=2.10, SD=0.72) in the Therapeutic Interventions category.

Participants reported the most critical to practice items in The Teaching-Coaching category was *Acting autonomously in guiding family members* (M=2.30, SD=0.57). The highest rated item in the Diagnostic Functions category in the Critical to Practice Scale on the NCS was *Developing documentation of patient care* (M=2.79, SD 0.42).

Table 1: Critical to Practice Scale: Managing Situations

Items in the Managing Situations Category of the NCS	M	SD
Acting appropriately in life-threatening situations	3.00	0.00
Able to recognize situations posing a threat to life early	2.90	0.45
Promoting flexible team co-operation in rapidly changing situations	2.75	0.44
Prioritizing my activities flexibly according to changing situations	2.75	0.55
Planning care consistently with resources available	2.70	0.47
Coaching other team members in mastering rapidly changing situations	2.65	0.49
Keeping nursing care equipment in good condition	2.55	0.69
Arranging debriefing sessions for the care team when needed	2.40	0.75

Note: N=20. Results for the Managing Situations Category on the NCS
3=very critical to practice, 2=somewhat critical to practice, 1=not critical to practice

The Helping Role category contained the second highest item on the Critical to Practice Scale *Planning care according to individual needs* (M=2.95, SD= 0.22, Table 2). Just after this item in the Helping Role category in the Critical to Practice Scale was *Modifying the care plan according to individual needs* (M=2.90, SD=0.31).

Table 2: Critical to Practice Scale: Helping Role

Results for the Helping Role Category of the NCS	M	SD
Planning patient care according to individual needs	2.95	0.22
Supporting patients' coping strategies	2.70	0.47
Evaluating critically own philosophy in nursing	2.40	0.75
Modifying the care plan according to individual needs	2.90	0.31
Utilizing nursing research findings in relationships with patients	2.80	0.52
Developing the treatment culture of my unit	2.60	0.60
Decision-making guided by ethical values	2.85	0.37

Note: N=20. Results for the Helping Role category on the NCS
 3=very critical to practice, 2=somewhat critical to practice, 1=not critical to practice

5 Conclusions

There are varying definitions of competence and what it means to be competent. In this study, experts determined different areas of nursing practice require different knowledge and skill sets. While nursing is a constantly evolving practice, the priority for health care professionals, stakeholders, accreditation agencies and professional organizations is safe quality care. This is the essence of competence in adapting and constantly evolving in knowledge and skills.

Evaluating each item on the NCS using the critical to practice scale provides insight to the necessary skills and knowledge needed to be competent in nursing. The item ranked most critical to practice, *Acting appropriate in life threatening situations*, underscores the importance of nursing competence and validates inclusion of the item on the NCS. Further, the inclusion of *Developing documentation of patient care* as one of the items that ranked most critical to practice is a basic skill taught in schools nationwide.

Frequently used items are necessary for practice and, therefore, represent abilities a competent nurse should demonstrate. The mean of the Critical to Practice scale was reported for each of the seven categories of the NCS based on results from surveyed teacher. Teacher identified life-saving and imminent decision making as most critical to practice, which is consistent with professional standards in practice. The three items that ranked the lowest on the Critical to Practice scale were related to an organizations workplace environment and recognizing a colleagues need for assistance.

Curricular components of nursing programs must be relevant to current nursing practice in order to prepare students to enter the workforce. Using the items on the NCS, schools of nursing may establish curricular components that are relevant to practice. Establishing relevancy to practice in schools of nursing helps to narrow the focus of the curriculum to critical knowledge and skills. Currently many schools of nursing suffer

from too much content and often struggle what content to delete (Benner, Sutphen, Leonard, & Day, 2010). This survey may act as a guide to reform curriculum by helping nurse educators determine which information to delete from the current content laden curriculum. In addition items on the NCS may be compared to current curricular and accreditation standards to help establish key content areas of the nursing curriculum.

Thus registered nurses can reflect on their own practice and adjust their approach to the workforce, further enhancing competence (Meretoja, Isoaho, & Leino-Kilpi, 2004). Nurses spend the most amount of time with patients (Aiken et al., 2012) and must work in a variety of different settings. Current standards of practice from professional organizations are obscure and difficult to measure. The current nursing shortage combined with the estimated number of nurses that will be retiring in the upcoming years, will require new nurses to enter the workforce. The new nurses and all nurses must be competent in their care to ensure the best patients outcomes and the safest care possible.

The sample for this study was restricted to individuals who were employed as a nursing teacher member. Diversity within the sample was limited to full-time nursing teacher at a state college. Although nationwide associate degree programs reflect race and ethnicities within the nursing workforce, generalizability of the results may not be applicable to all nursing students (National League for Nursing, 2012). This study used a self-reported questionnaire and is limited by the accuracy of participants' responses. However, the results of this study can guide the further research where nursing students, graduates and employees could be included as participants. Further research is also needed to explore other ways to bridge the academic-practice gap. Studies involving bedside nurses would provide a direct link to practice and allow for comparison between nurse educators and bedside nurses.

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Factors Influencing the Value of CPD Activities Among VET Teachers

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Abstract

Context: Teachers in vocational education and training (VET teachers) have specific conditions for their continuing professional development (CPD). They have a background in an initial occupation, in which they now teach and train the next generation. Thus, as VET teachers, they are expected to master the knowledge and skills of that occupation, even if they have now crossed the boundary from the community of their initial occupation to the community of the school. This study explores the perceived values among VET teachers of different activities that may contribute to their CPD in teaching subjects/initial occupations. The study examines VET at the upper secondary level in Sweden. Here, the VET teachers have the main responsibility for students' vocational learning in the vocational subjects, including the work-based parts. In the latter parts, the teachers are supplemented by supervisors at the workplace.

Approach: We argue for the duality of a VET teacher identity with a professional competence that comprises two intertwined parts – teaching skills, and knowledge of the teaching subjects based in the teachers' initial occupations. Our study is based on a situated learning perspective, and the empirical findings particularly concern values created from learning through participation and boundary crossing. CPD activities typically include some form of participation in and/or boundary crossing between school and work-life practices. In the analysis we also include the possible influence of institutional, situational, and dispositional drivers and barriers for participation in different activities. The research question was: what factors can explain the variation in perceived values created by participation in different CPD activities among VET teachers? The study was conducted as a survey of 886 Swedish VET teachers. Focus was put on the values

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created through different types of activity, values for the teachers' vocational knowledge, for networks in working life, and for teaching. The data were primarily analysed using logistic regression modelling.

Findings: Dispositional drivers, the teacher's sex, and regular performance of the activity are important for the perceived value. The dispositional factor is the one most commonly retained, and it has a consistently positive effect. Factors such as educational background and vocational training have weaker influence, which suggests that individual driving factors are important when VET teachers assess the value of CPD activities.

Conclusions: The study covers a general challenge for VET teachers, but is of particular relevance in systems with a high degree of school-based VET, full-time employed VET teachers, and VET teachers who are responsible for students' vocational learning. Here, the values for vocational knowledge, for networks, and for teaching that are created through different activities are important for the VET teacher identity. They are also interrelated, and together they provide professional development in relation to the initial occupation, and for the occupation as a vocational teacher.

Keywords: VET, Vocational Education and Training, Continuing Professional Development, Value Creation, Vocational Teachers, Staff Development

Paper Type: Research Article

1 Introduction

Teachers have a professional competence that comprises two intertwined parts – teaching skills and knowledge in the subject that they teach. For teachers in vocational education and training (VET), these two parts mean a dual professional competence (Fejes & Köpsén, 2014), as the knowledge in a vocational subject in VET means professional, or occupational, competence. To maintain and develop this occupation-related subject knowledge, the VET teacher must engage in continuing professional development (CPD) that involves not only the teaching competence, but also knowledge and skills in their initial occupation.

This study focuses on VET teachers' CPD in their vocational subject. We have studied VET at the upper secondary level in Sweden. Here, two main categories of teachers are employed: those who teach general subjects such as maths, Swedish, and English; and those who teach vocational subjects. This article focuses on the latter category. The VET teachers have the main responsibility for students' vocational learning in the vocational subjects, including the work-based parts, during which teachers are supplemented by supervisors at the workplace.

VET teachers, with few exceptions, have a background in an occupation for which they now teach the next generation. Among the exceptions, in which the VET teachers normally have a higher qualification than the one their students are studying towards, are nurses who teach assistant nurses-to-be. Thus, these VET teachers have a background with a certain vocational competence and identity. However, most of them now

have full-time employment as VET teachers, which means that they have a challenge concerning CPD to maintain and develop their vocational competence, i.e. the subject contents from the initial occupation that they are expected to master. This is a challenge for VET teachers in any national system, although the needs differ between different traditions and cultures (Brockmann, Clarke, Méhaut, & Winch, 2008; Brockmann, Clarke, & Winch, 2008; Grollmann, 2008). However, the issue is particularly relevant in systems in which the teachers have a high degree of responsibility for students' vocational learning, even when it is based in the workplace, as in Sweden. In, for example, the German dual apprenticeship system, the situation is different, with the companies and chambers of commerce having a dominant role with responsibility for workplace learning and examinations, while vocational schools have a subordinate role (Gessler, 2017). Nevertheless, our findings are relevant also in such systems, particularly in light of the German policy-level ambition of greater collaboration between schools and companies. Furthermore, the challenge is greater for full-time employed teachers with more limited opportunities to combine teaching with work in their initial occupation.

This study is part of a larger project, in which we have previously analysed participation in a national initiative, where grants from the Swedish National Agency of Education supported VET teachers' workplace-based CPD, by which they gain practical experience in their initial vocations, and other shorter industry-related CPD activities (Andersson & Köpsén, 2015; Köpsén & Andersson, 2017). Furthermore, we have analysed results from a large-scale survey among VET teachers to identify factors that influence the participation in a number of activities that have the potential to contribute to these teachers' CPD (Andersson & Köpsén, 2017). In the present study, based on the same survey data, our focus is the outcomes or values created from these activities in terms of CPD. We are interested in what factors can explain high perceived values with respect to VET teachers' CPD. Our previous analysis (Andersson & Köpsén, 2017) showed significant differences in perceived values between teachers whom we had categorised as "participants" and "non-participants" in the different activities. We continue the analysis here, and explore factors that can explain the variation in (perceived) values created from the CPD activities. We analyse also the effect that participation has when additional factors are included. More precisely, our research question is: what factors can explain the variation in perceived values created by participation in different CPD activities among VET teachers?

2 Theoretical Perspective

We argue for the duality of a vocational teacher identity, as VET teachers need to be competent in teaching and in current occupational practice related to their initial occupations (Fejes & Köpsén, 2014). We have here not only examined CPD opportunities that may increase occupational competence, but also analysed the perceived value of such CPD for teaching. In other words, VET teachers must possess current work-life experience of the occupation related to their teaching subject in order to prepare the vocational students for working life (e.g. Köpsén, 2014; Robson, Bailey, & Larkin, 2004).

Our study is based on a situated perspective on learning (Lave & Wenger, 1991; Wenger, 1998; Wenger-Trayner, Fenton-O’Creevy, Hutchinson, Kubiak, & Wenger-Trayner, 2015), and the empirical findings particularly concern values created from *learning through participation* and *boundary crossing*. From this perspective, knowledge is seen as situated in specific communities of practice, and learning takes place through active participation in these. However, a community of practice is not stable but changing; and the possession of current knowledge, understandings and skills requires active involvement in the community of practice.

It is through movements between different communities of practice, known as “boundary crossings”, in landscapes of practice, that individuals learn and develop a nexus of identities (Akkerman & Bakker, 2011; Wenger-Trayner et al., 2015). Following our theoretical framework, we argue that such boundary crossings are particularly important in the way in which VET teachers learn and shape their vocational teacher identity (Fejes & Köpsén, 2014).

These teachers crossed the boundary between the practice of their initial occupations and the practice of VET when they became teachers. However, they benefit from crossing this boundary back and forth during their career as a teacher, in order to maintain and develop their occupational knowledge. Thus, such boundary crossings are crucial for them to remain competent in current occupational knowledge, understanding and skills in the subject they teach. It is also probable that VET teachers benefit from boundary objects, and that participation in other communities of practice that are interconnected with the specific occupational community will contribute to updating their occupational knowledge and skills. Such participation may take the form of attending conferences, participating in networks, reading journals, running development projects in schools, or studying in further education (Broad, 2016).

We use here Cross’s (1981) analysis of how institutional, situational, and dispositional barriers may influence participation in adult education or (in our case) CPD. “Institutional” factors are situated in the organisation of the VET schools and in the workplaces for which students are trained. “Situational” factors refer to the life situation of the teacher, and “dispositional” factors concern the teacher’s personal motivation. These factors may also influence the extent of CPD activities.

We draw on a holistic perspective of CPD, including all the activities that teachers engage in in order to improve their work. This perspective also considers system factors (Bolam & McMahan, 2004; Day & Sachs, 2004). However, here the focus is participation in activities in which VET teachers can develop vocational or occupational knowledge that is current in the industry. Furthermore, we include activities that can enhance their knowledge and skills even though not designed for this – in other words informal and unintentional professional development (Eraut, 2007; Fraser, Kennedy, Reid, & Mckinney, 2007).

The particular focus of the present study is the outcome of different types of participation and boundary crossing for VET teachers’ CPD. In other words, we analyse the values created from such activities, “the value of the learning enabled by community involvement and networking” (Wenger, Trayner, & de Laat, 2011, p. 7). More precisely, we study how the respondents perceive the way in which CPD is valuable to them.

3 Prior Research

Research on teachers' CPD in general is extensive, and an overview of this field is beyond the scope of the present article with its focus on VET teachers. But it is important to point out, as Fraser et al. (2007) do, that different sites of learning should be taken in consideration, and not only what has "been traditionally valued as probable sites for teacher learning" (ibid., p. 167). Furthermore, all teachers' learning includes a number of different and more or less connected domains: pedagogy, pedagogical content knowledge, subject-matter content, and learning in relation to participation in the school organisation (Hoekstra, Kuntz, & Newton, 2017). In a study of teachers' professional development, which focused on pedagogy, Boyle, While and Boyle (2004) identified observation of colleagues and sharing practice as the most popular longer-term professional development activities. The study showed that a majority of the teachers who take part in such longer-term activities change their teaching practice.

What is particular for VET is that the subject-matter content is situated in specific communities of practice in working life. We discuss here the outcomes or values created from teachers' CPD concerning such subject-matter content, and the related pedagogical content knowledge, i.e. knowledge concerning how content based on work-life practices can be taught in VET. However, research concerning VET teachers' CPD is limited (de Rooij, as cited in Parsons, Hughes, Allinson, & Walsh, 2009, p. 92) and has mainly focused on teaching competence (e.g. Bound, 2011; Messmann & Mulder, 2011). Vähäsantanen, Hökkä, Eteläpelto, Rasku-Puttonen and Littleton (2008) studied identity negotiation among Finnish teachers in VET and in teacher education at university level. They showed that the teachers' agency within the organization is important for their commitment. Stephens (2015) discussed the professional development of teachers in career and technical education programmes in Michigan, with a focus on teachers with extensive experience from industry who are recruited as teachers and must develop pedagogical knowledge and skills. However, a study of both students' and teachers' views of what a "good VET teacher" is in Australia, for example, showed that both students and teachers consider pedagogical skills as *well as* expertise and experience from industry to be important (Smith & Yasukawa, 2017). Thus, the boundary-crossing character of VET teachers' work seems to be important for good VET teaching. Hoekstra and Crocker (2015) show that interaction between working life and the educational context is important, and suggest that further investigations with this interaction in focus are required. In a later study from Canada, Hoekstra et al. (2017) showed that pedagogical content knowledge and pedagogy were most often in focus in everyday learning episodes among 27 instructors in vocational and professional education, while the subject-matter content was in focus more rarely. The work presented here contributes to this area of research, with a particular focus on VET teachers' CPD activities related to the vocational subject-matter contents and how up-to-date the outcome is. Some previous studies present results relevant to the work presented here, but prior research has mainly examined conditions for CPD, rather than the outcomes or value creation.

Vocational knowledge is the focus of Broad's (2013, 2015, 2016) studies of how VET teachers in further education colleges in the UK maintain and develop their occupa-

tional expertise. Of 12 pre-defined CPD activities, reading books, journals, and online material was most common among the 57 respondents in the study. We will also discuss here “unintended CPD”, and thus access to knowledge not “codified” for use in VET is particularly interesting. Different activities that provide CPD experience, in which teachers engage with more or less “tacit” or uncoded or semi-coded knowledge, are also included. Such activities include practicing, peer observation, shadowing, students’ placements, involvement with professional bodies, educational trips, and hosting guest speakers. They include also attending courses and workshops (Broad, 2016). Three key drivers for CPD were identified: a passion for the subject/occupation, keeping occupational knowledge up-to-date, and improving teaching and learning. These drivers can be seen as perceived values of CPD. Broad (2013) discusses how teachers work hard to achieve these results, even in the face of organisational barriers. Thus, drivers for CPD are mainly to enhance knowledge and teaching, rather than to meet external requirements. Workload and funding are notable barriers. However, the main barrier seems to be the lacking of suitable networks, or the existence of only ‘impoverished’ networks, which may also be a result of teachers’ workload and lack of time (Broad, 2015).

Lloyd and Payne (2012) have shown how conditions of employment have an impact on VET teachers’ opportunities to maintain the knowledge and skills related to their initial occupation. For example, working part-time as a teacher provides a natural opportunity to continue to work in the initial occupation. Established structures and management support are other conditions that influence the VET teachers’ possibilities and motivations to move between the practice of school and the practice of working life (Frisk, 2014; Opetushallitus, 2014). In a small-scale study, Fejes and Köpsén (2014) identified several constraints on VET teachers’ participation in working life, i.e. constraints that make it difficult for teachers to maintain the occupational knowledge needed to prepare the vocational students for working life. VET teachers who do not maintain up-to-date vocational knowledge are, therefore, not competent to teach on the advanced courses of VET. Another aspect of this is how VET teachers value the different aspects of the dual professional competence. Nylund and Gudmundson (2017) found two types of identity among building and construction teachers – “craftsmen” and “teachers”. The “craftsmen” (who were working as VET teachers) saw vocational knowledge and culture as more important than, and differentiated from, pedagogical knowledge related to a school culture; while “teachers” saw these types of knowledge as more closely associated.

Brennan Kemmis and Green (2013) showed a corresponding duality in a study of how Australian VET teachers view their pedagogy. The VET teachers expressed a strong connection to the workplace and the vocation, which in some cases resulted in tensions in relation to other categories of teacher who were not based in another, initial occupation.

A study from New Zealand presents an even more complex picture of the VET teacher, or “trade tutor”. Maurice-Takerei (2016) describes a “multi-dimensional identity”, that includes simultaneously being a bricoleur, an engineer, and a “kaitiaki” (a Maori concept). Thus, a VET teacher is a skilled practitioner who finds creative short-term solutions (a bricoleur), a structured and systematic innovator and planner (an engineer), and a “guardian, mentor and guide” (p. 128) who builds bridges between worlds and protects and passes on trade skills (a kaitiaki).

Research in Sweden has provided more insight into the part of VET teachers' CPD that concerns vocational knowledge and identity. As mentioned above, the present study is part of a larger research project, presented above in the Introduction. The study of a national initiative to stimulate VET teachers' workplace-based CPD indicated that vocational area and the geographical region in which the VET teachers are employed influence the VET teachers' participation. Teachers from the areas of technology and construction were underrepresented among the participants, while the participation rate in industry arrangements among construction teachers was higher. Teachers from highly populated municipalities were overrepresented, and the type of municipality was the strongest predictor for recurrent participation (Andersson & Köpsén, 2015, Köpsén & Andersson, 2017). These studies of participation in the national initiative raised new questions, and the work presented here to examine VET teachers' participation in various CPD activities was initiated. The first analysis (Andersson & Köpsén, 2017) showed, among other things, that reading is the most common CPD activity, and reading together with work in the teacher's initial occupation is also the activity in which the variation in performance can be explained to the highest degree. These results agree with those obtained by Broad (2016). Furthermore, longer work experience in the initial occupation increases the probability that a VET teacher is still active in the occupation, parallel to the work as a teacher. Longer teaching experience corresponds to a lower probability of this activity.

4 The Study

The present study uses a survey designed to measure CPD activities. The data have primarily been analysed using logistic regression modelling. Sub-sections 4.1–4.3 describe the questionnaire development and the data analysis.

4.1 Questionnaire Development

We developed a questionnaire to measure VET teachers' participation in CPD and the perceived value created from such activities. It was designed also to identify barriers and drivers for participation. Background data was collected from registry data, supplemented by the questionnaire.

As the theoretical perspective presented above indicates, learning through participation in relevant communities of practice is seen as central for VET teachers' development of occupational identity. Such participation involves boundary crossings between school and working life. Relevant variables, i.e. variables that can represent or explain participation in, and boundary crossing between, different communities of practice were identified.

Additional drivers of, and barriers to, participation were identified, and classified as institutional, situational, or dispositional (Cross, 1981).

Several types of CPD activity were considered. These activities had been identified in prior studies, or were based on the theoretical perspective. They were based on a pre-understanding of possible CPD activities and on conversations with VET teachers during

the development of the questionnaire. The activities concern VET teachers' professional development in three ways. Firstly, in terms of crossing boundaries between school and working life; secondly, in terms of studying and learning, formally and informally; and thirdly, in activities in which teachers' knowledge is to be incorporated into teaching practices. This allowed eight activities to be identified, which were classified into three broad activity groups: relations to working life, vocational learning, and development activities. These activity groups are not used analytically in this article; they are simply used as structural aids.

The activities *related to working life* were: i) work in a workplace or own business, ii) study visits to workplaces, and iii) coordination of student placements or apprenticeships. The activities classified as vocational learning were: iv) participation in industry arrangements (such as conferences or short courses arranged by the industry); v) formal education; and vi) reading specialist and technical literature within the vocational subject area taught. The final group of activities were those aimed at the *development of vocational teaching*, and were: vii) the pursuit of projects together with industry representatives; and viii) work with pedagogical improvement. Three types of item were covered for each activity: i) whether, and how often, the teachers had performed the activity during the preceding two years, ii) the perceived created values or outcomes of the activity, and iii) the perceived drivers and barriers.

For each activity, six items related to three types of value were measured: values concerning vocational knowledge, networks in the industry, and teaching. These three values were central CPD outcomes in the theoretical framework described above. This includes knowledge/learning as a central aspect of the occupational identity developed by participation, networks as important for boundary crossings between school and workplaces, and teaching-related effects as a result of boundary crossings back to school. In other words, having specific vocational knowledge means that teachers have mastered the content of their teaching practice; the networks are crucial for the teacher's relationship to the occupational practice and possible boundary crossings; and teaching is the central activity in the present occupational practice of the VET teacher.

Eight items were presented for each activity relating to perceived drivers and barriers, concerning institutional, situational, and dispositional aspects (Cross, 1981). For example, we asked about the importance of support from the school organisation and the way teaching work is organised (institutional), about the teacher's family situation and the economic value in terms of income (situational), and about the personal interest and perceived need to develop occupational knowledge (dispositional).

Items concerning the teachers' vocational area of teaching were included in the background data, as was vocational area. This was to take the different types of vocational knowledge and practice that each vocation requires, and different institutional contexts. The length of experience in their initial occupations was included as a measure of previous participation in relevant communities of practice. During the development of the questionnaire, VET teachers were consulted on content, and the final questionnaire was assessed by experts from Statistics Sweden, whose proposals improved its quality.

4.2 Data Collection and Participants

The survey was distributed by Statistics Sweden and respondents could choose to answer with paper and pen or over the internet. The sample was collected using stratified randomised sampling, with strata based on respondents' sex, age, and type of school. The initial sample consisted of 2,000 Swedish teachers working at upper secondary level, out of a population of 11,461 identified by Statistics Sweden. After two reminders, 982 answers had been received. After correcting for overlay, the final sample consisted of 886 valid responses, yielding a response rate of 47 percent.

Background data for the respondents were collected by Statistics Sweden from registry data. These data were selected to provide information about teachers' personal background and institutional and situational aspects of their present participation in the practices. The data included information on respondents' sex, educational training, length of teaching experience, type of school, type of employment, degree of employment as a teacher, and the type of municipality in which the teacher was active. Other data collected included age, type of school (publicly or privately owned), and type/level of training in the initial occupation. These were later excluded, as they had no significant influence on the analysis.

Among the 886 vocational teachers who responded and for whom survey and registry data were used in the analysis, 437 were women and 449 men. The distribution of the teachers in six vocational areas across sex is presented in Table 1¹. The age of the respondents ranged from 23 to 78 years, with the average age being 48.7 ($SD = 10.7$); of these, 5.9 percent are 65 years or older, which is a common age of retirement in Sweden.

Table 1: Numbers of female and male teachers across the six different vocational areas

Vocational area	Female	Male	N
Care	132	19	151
Construction	7	91	98
Practical-aesthetical	144	49	193
Service	108	51	159
Technology	15	138	153
Vehicles	0	87	87

There is a broad range of experience, measured as the number of years as a teacher, from one year to 41 years, with an average of 9.9 ($SD = 8.3$). Most of the teachers (55%) work full time, and of the 45 percent who are employed part-time, nearly 70 percent (69.9%) have a degree of employment of more than 50 percent.

¹The survey data include information on vocational area for 818 of 886 teachers. A small number reported teaching in more than one area, which means that the total number of respondents in the table is 841

4.3 Data Analysis

Logistic regression was used to model the perceived value. One model was constructed for each CPD activity and outcome, resulting in 24 models. The indexes for perceived value were constructed through indexes of averages – one for each of the eight activities across each perceived value with six items (scale 1–4) per activity. The indexes measure the perceived value related to the teachers' own vocational knowledge and skills, the improvement of their own teaching, and the development of their networks in the industry. The perceived values have been dichotomised into low value (≤ 3) and high value (>3). The distribution of the perceived value of the types of CPD activity and across vocational knowledge, teaching, and teachers' industrial network is shown in Table 2. The perceived values created from these activities (high/low) were tested against teacher training, teaching experience, and work experience from initial occupation. The type of municipality, respondent's sex, whether the tested activity had been performed at least once each year during the preceding years (each semester for reading), and institutional, situational and dispositional drivers and barriers were all included in the models.

The logistic regression models were run stepwise in SPSS (ver. 24) to remove variables. While the use of stepwise regression is problematic, in that variables are removed for mathematical reasons rather than theoretical ones, its use is justified in an exploratory study such as this, where the key interest is to explore variables that show influence rather than to test a theoretical model.

Table 2: Distribution of perceived value (high/low) for different types of CPD activity across scales (14) of vocational knowledge, improvement of teaching, and development of teacher's network

Activity group	CPD activity	Vocational knowledge			Teaching			Networks		
		High	Low	N	High	Low	N	High	Low	N
Relations to working life through:	Work	459	349	808	381	415	796	456	351	807
	Study Visits	251	558	809	265	537	802	373	435	808
	Student Placements	186	580	766	189	575	764	337	434	771
Vocational learning through:	Industry Arrangements	328	469	797	300	489	789	268	524	792
	Studying	219	553	772	256	515	771	85	682	767
	Reading (semester)	268	539	807	276	530	806	82	712	794
Development activities:	Projects	273	492	765	263	493	756	270	491	761
	Pedagogical Improvement	202	549	751	314	433	747	120	617	737

Some variables were rejected in all models. These were removed, and the models were re-run without them. The variables rejected were age, type of school (publicly or privately owned), and type/level of training in the initial occupation. The nature of teacher training had been formed into three categories based on the registry data: having a *teaching degree*, *other teacher training*, or *no such training*. The variables that measured experience, in both teaching and in the initial occupation, were divided into three categories: ≤ 3 years, 4–7 years, and ≤ 8 years. The type of municipality was included as a geographical dimension, and based on an established categorisation of Swedish municipalities (Statistics Sweden, 2011, p. 14), here divided into four groups: *The main large city areas*, *the other large city areas*, *highly populated municipalities*, and *sparse populated municipalities*. The respondent's sex rather than vocational area was used to avoid multicollinearity problems due to strong interactions between sex and vocational area, as well as the fact that some of the respondents were active in more than one vocational area.

From the survey, data on participation in the activities were used, as were indexes for dispositional, institutional and situational barriers and drivers. Participation differed between the activities (Table 3), and has been included in the analysis as a binary variable. Apart from reading, the respondent has been considered to have participated in an activity if it has been performed at least once per year in the preceding two years. For reading, every semester was used, due to the high frequency of the activity over two years. The indexes for barriers and drivers for each activity were constructed through a grouping of eight items (scale 1–5) into three indexes with average values for each.

Table 3: Participation in types of CPD activity at least a year (every semester for reading) among VET teachers

Activity group	CPD activity	Participation (%)	N
Relations to working life through:	Work	60.2	791
	Study Visits	86.3	797
	Student Placements	80.8	791
Vocational learning through:	Industry Arrangements	64.0	789
	Studying	22.8	776
	Reading (semester)	80.6	789
Development activities:	Projects	43.1	785
	Pedagogical Improvement	68.2	793

5 Findings

The perception of a high value differs between the activities (Table 2). The initial impression given by Table 2 is that differences in perceived values among CPD activities

are as expected. For example, the perceived values concerning development of networks have a very low proportion of individuals who perceive a high value created from studying and reading, as these activities are more individual than linked to others. In contrast, the CPD activity of work generally has a high proportion of individuals who perceive a high value across vocational knowledge and networks. While these activities differ in their outcomes, high or low perceived value, the underlying factors may or may not differ. The perceived value creation in terms of vocational knowledge, improved teaching, and development of teachers' networks, have, therefore, each been tested against eight types of activity using stepwise logistic regression. The activities are here reported in three broad activity groups: relations to working life, vocational learning, and development activities. (As noted earlier, these groups are used to structure the results, and are not intended to be analytical.) The final model is presented for each regression, due to the number of models used (24) and the exploratory nature of the study. The number of iterations (steps) taken to reach the final model is reported for each model.

5.1 Value Creation in Relation to Working Life

A key component for VET teachers is the connection to the vocation and the working life, i.e. the communities of practice of their initial vocations (Andersson & Köpsén, 2017; Köpsén, 2014). Activities included here are *work* in a workplace or own business, *study visits* to workplaces, and coordination of *student placements* or apprenticeships. Table 4-6 present the final regression models for the effects on high perceived value for vocational knowledge, teaching, and networks, for each activity.²

For work, positive effects on the perceived value were found from the respondent being female, from having performed the activity more frequently, and from institutional and dispositional drivers. Teacher training was retained for vocational knowledge as well as teaching, though here the effect was generally negative for those with a teaching degree. The effect of the dispositional driver points towards individual factors, and performing the activity contributing to a higher perceived value. The positive effect of institutional drivers may be connected to the influence that the school has on the teaching position, relative to the opportunity to work in the initial occupation. The negative effect of teacher training for values created from work may be due to the fact that teacher training creates a value in its own right, which makes the impact of work less for those with a teaching degree than it is for those with other forms of training.

For study visits the models are fairly accurate, but the fits for teaching and network are rather poor. The interpretation of the models, therefore, should be taken with some care. That said, dispositional and situational drivers stand out as contributing factors to a high perceived value of study visits, while the respondent's sex has a positive contribution for teaching and networks. The type of municipality comes into effect for teaching, where large city areas have a negative effect. Teacher training has a negative effect for networks. As with working, the fact that the respondent's sex is important, as is also the nature of the drivers, points towards individual factors. It is noteworthy

²Blank spaces in the tables 4-11 indicate variables that were not retained in the final models.

here that performing the activity is not retained in the model. The poor fits of these models, however, mean that these results must be treated with some leniency, even though the results are consistent with the results of other activities. Student placements differ from study visits in that the performance of the activity is retained and that the respondent's sex generally is not, with the performance of activity and the respondent's sex having a positive effect for perceiving a high value. The type of municipality and the nature of teacher training have similar effects here as they had for study visits, in that the perceptions of value creation is lower for large cities, for teaching, while teacher training has a lower effect for networks. The final model for vocational knowledge has a reasonable accuracy, but the fit is poor and the model should be interpreted with caution.

Generally speaking, the models related to working life show that individual factors contribute to the creation of a high perceived value. Dispositional drivers stand out as consistent, with engaging in the activity and the respondent's sex being frequently retained. Teacher training (when retained) points towards a negative effect from having a teaching degree, whereas experience, both from teaching and work, is not retained in any model. This suggests that the teachers' individual motivations and performance of the activity, rather than experience (both teaching experience and experience of work in the initial occupation), have a general effect. The effect of the respondent's sex is probably connected to the strong effect of gendered subject areas.

Table 4: Final logistic regression models for working life: work

	Work								
	Vocational knowledge			Teaching			Networks		
	B	SE	OR	B	SE	OR	B	SE	OR
Constant	-3.253 ***	0.542	0.039	-3.783 +	0.555	0.555	-2.883 ***	0.511	0.056
Teacher training									
Teaching degree	-0.460 ***	0.181	0.631	-0.434 +	0.177	0.648			
Other (base = No training)	-0.205	0.278	0.815	0.193	0.277	1.213			
Type of municipality									
Three large city areas									
Other large city areas									
Low-pop. municipalities (base = Hi. pop. muni.)									
Sex	0.448 +	0.171	1.565						
(base = male)				0.406 +	0.168	1.501	0.289 ***	0.162	1.335
Performed activity (base = No)	0.995 +	0.171	2.704	0.748 +	0.170	2.114	0.763 ***	0.165	2.144
Driver/barrier									
Institutional	0.277 +	0.117	1.319	0.270 +	0.113	1.310	0.293 ***	0.111	1.340
Situational	-0.310 ***	0.102	0.734						
Dispositional	0.688 +	0.143	1.991	0.498 +	0.137	1.645	0.331 ***	0.131	1.393
Steps	4			5			6		
-2LL	846.558			870.756			890.877		
	$\chi^2 = 108.932, df = 8, p < .001$			$\chi^2 = 82.433, df = 6, p < .001$			$\chi^2 = 62.380, df = 4, p < .001$		
Nagelkerke R ²	.194			.151			.115		
Hosmer and Lemeshow Test	p = .143			p = .335			p = .397		
Classification accuracy	0.683			0.647			0.629		

*** p < .001, ** p < .01, * p < .05, + p < .1

Table 5: Final logistic regression models for working life: study visits.

	Study visits								
	Vocational knowledge			Teaching			Networks		
	B	SE	OR	B	SE	OR	B	SE	OR
Constant	-4.303 ***	0.594	0.014	-3.643 ***	0.587	0.026	-3.120 ***	0.532	0.044
Teacher training									
Teaching degree							-0.470 **	0.170	0.625
Other (base = No training)							-0.348	0.260	0.706
Type of municipality									
Three large city areas				0.060 +	0.237	1.062			
Other large city areas				-0.546 ***	0.224	0.579			
Low-pop. municipalities (base = Hi. pop. muni.)				0.041 *	0.322	1.042			
Sex (base = male)				0.381 +	0.170	1.463	0.276 +	0.160	1.318
Performed activity (base = No)									
Driver/barrier									
Institutional							0.289 *	0.121	1.336
Situational	0.234 ***	0.136	1.263	0.269 +	0.137	1.308			
Dispositional	0.656 ***	0.135	1.908	0.486 +	0.133	1.626	0.452 ***	0.126	1.571
Steps	8			5			6		
-2LL	830.193			870.756			933.622		
	$\chi^2 = 40.355, df = 2, p < .001$			$\chi^2 = 51.352, df = 6, p < .001$			$\chi^2 = 46.403, df = 6, p < .001$		
Nagelkerke R ²	.078			.098			.084		
Hosmer and Lemeshow Test	p = .009			p = .066			p = .117		
Classification accuracy	0.715			0.699			0.629		

*** p < .001, ** p < .01, * p < .05,

Table 6: Final logistic regression models for working life: student placements

	Student placements								
	Vocational knowledge			Teaching			Networks		
	B	SE	OR	B	SE	OR	B	SE	OR
Constant	-5.255 ***	0.630	0.005	-4.912 ***	0.621	0.007	-3.089 ***	0.502	0.046
Teacher training									
Teaching degree							-0.220 ***	0.176	0.802
Other (base = No training)							-0.723	0.287	0.485
Type of municipality									
Three large city areas				0.181	0.267	1.198			
Other large city areas				-0.388	0.251	0.679			
Low-pop. municipalities (base = Hi. pop. muni.)				-0.322	0.381	0.725			
Sex (base = male)							0.360 *	0.168	1.434
Performed activity (base = No)									
Driver/barrier									
Institutional							0.207 +	0.113	1.230
Situational									
Dispositional	0.816 ***	0.133	2.262	0.845 ***	0.134	2.328	0.404 **	0.125	1.498
Steps	8			7			5		
-2LL	671.142			671.777			853.496		
	$\chi^2 = 57.162, df = 3, p < .001$			$\chi^2 = 64.276, df = 5, p < .001$			$\chi^2 = 54.783, df = 6, p < .001$		
Nagelkerke R ²	.125			.139			.107		
Hosmer and Lemeshow Test	p = .037			p = .106			p = .926		
Classification accuracy	0.756			0.767			0.622		

*** p < .001, ** p < .01, * p < .05,

5.2 Value Creation in Relation to Vocational Learning Activities

It can be argued that continuing professional development requires an engagement with the subject matter, and thus three activities with such a focus are explored in this section: visiting *industry arrangements* such as conferences and workshops, *studying* in formal education, and *reading* literature relevant to the vocation. Table 7-9 present the results for these activities.

Factors that contribute to higher perceived value creation from industry arrangements are the respondent's sex and dispositional drivers for networks, and having performed the activity for vocational knowledge and networks. The high importance of dispositional drivers, together with that of performing the activity, suggest that individual actions and factors are important. Teacher training, with a teaching degree or some other form of training, has a negative effect on perceiving a high value, relative to those with no training. This may be due to those with formal education tending to teach in more theoretical areas. All municipalities with the exception of highly populated municipalities have a negative impact on perceiving a high value.

Dispositional drivers and the respondent's sex again show a positive contribution to perceiving a high value creation from formal study, as does having performed the activity of formal studies for teaching and networks. Here, teaching experience has a negative effect for teaching, which suggests that increased teaching experience leads to a lower value being perceived created from studies. Respondents may consider that study has been supplanted by teaching experience.

Reading, which in contrast to the other activities was measured per semester rather than per year, continues the trend of having dispositional factors and the respondent's sex contributing positively to a higher perceived value. This is also true for vocational knowledge and teaching, but not for networks. Further institutional drivers have a positive effect. Here, the effect of teacher training is that the effect of reading on networks is negative for those with formal education, whereas it is positive for those with informal training. Experience in teaching here shows a negative contribution to perceiving a high value for those with relatively short experience, while it is positive for those with longer than 8 years.

The models for vocational learning activities are overall similar to those of relationship to working life, in that dispositional drivers, respondent's sex and performing the activity have positive effects for a perceived high value creation. As with working life, work experience is not retained in any model, while teaching experience is retained in some, where it has a negative effect.

Table 7: Final logistic regression models for vocational learning activities: industry arrangements

	Industry arrangements								
	Vocational knowledge			Teaching			Networks		
	B	SE	OR	B	SE	OR	B	SE	OR
Constant	-3.888 ***	0.578	0.020	-3.527 ***	0.559	0.029	-4.425	0.606	0.012
Teacher training									
Teaching degree	-0.495 ***	0.185	0.609	-0.589 ***	0.184	0.555	-0.554 ***	0.188	0.575
Other (base = No training)	-0.264 ***	0.283	0.768	-0.073 ***	0.277	0.93	-0.307 ***	0.293	0.736
Teaching experience									
4-7 years									
≥8 years (base ≤3 years)									
Type of municipality									
Three large city areas	-0.737 ***	0.248	0.479						
Other large city areas	-0.238 ***	0.222	0.788						
Low-pop. municipalities (base = Hi. pop. muni.)	-0.423 ***	0.342	0.655						
Sex									
(base = male)	0.976	0.176	2.653	0.947	0.176	2.577	0.816 ***	0.181	2.262
Performed activity (base = No)	0.415 ***	0.180	1.514				0.382 ***	0.187	1.465
Driver/barrier									
Institutional									
Situational									
Dispositional	0.769	0.130	2.158	0.639	0.128	1.895	0.767 ***	0.136	2.153
Steps	5			7			6		
-2LL	835.061			834.189			800.940		
	$\chi^2 = 105.809, df = 9, p < .001$			$\chi^2 = 77.998, df = 5, p < .001$			$\chi^2 = 85.051, df = 5, p < .001$		
Nagelkerke R ²	.190			.146			.160		
Hosmer and Lemeshow Test	p = .715			p = .127			p = .480		
Classification accuracy	68.8%			68.0%			70.5%		

*** p < .001, ** p < .01, * p < .05, + p < .1

Table 8: Final logistic regression models for vocational learning activities: studying

	Studying									
	Vocational knowledge			Teaching			Networks			
	B	SE	OR	B	SE	OR	B	SE	OR	
Constant	-4.753 ***	0.583	0.009	-3.685 ***	0.547	0.025	0	-5.466 ***	0.863	0.004
Teacher training										
Teaching degree										
Other (base = No training)										
Teaching experience										
4-7 years				-0.350	0.243	0.705				
≥8 years (base ≤3 years)				-0.504 *	0.213	0.604				
Type of municipality										
Three large city areas										
Other large city areas										
Low-pop. municipalities (base = Hi. pop. muni.)										
Sex										
(base = male)	0.759 ***	0.186	2.136	0.459 **	0.177	1.583	0.613 *	0.271	1.846	
Performed activity (base = No)				0.451 *	0.197	1.571	0.793 **	0.261	2.211	
Driver/barrier										
Institutional										
Situational										
Dispositional	0.822 ***	0.134	2.275	0.723 ***	0.123	2.062	0.658 ***	0.196	1.93	
Steps	8			6			7			
-2LL	724.462			777.290			430.800			
	$\chi^2 = 76.730, df = 2, p < .001$			$\chi^2 = 72.717, df = 5, p < .001$			$\chi^2 = 35.822, df = 3, p < .001$			
Nagelkerke R ²	.156			.144			.104			
Hosmer and Lemeshow Test	p = .816			p = .477			p = .261			
Classification accuracy	73.2%			69.0%			88.6%			

*** p < .001, ** p < .01, * p < .05, + p < .1

Table 9: Final logistic regression models for vocational learning activities: reading

	Vocational knowledge			Reading			Networks		
	B	SE	OR	Teaching			B	SE	OR
				B	SE	OR			
Constant	-7.819 ***	0.746	0	-7.574 ***	0.733	0.001	-9.940 ***	1.249	0.001
Teacher training									
Teaching degree							-0.536	0.341	0.585
Other							0.428	0.439	1.534
(base = No training)									
Teaching experience									
4-7 years							-0.788 +	0.423	0.455
≥8 years							0.207	0.366	1.229
(base ≤3 years)									
Type of municipality									
Three large city areas									
Other large city areas									
Low-pop. municipalities									
(base = Hi. pop. muni.)									
Sex	0.66 ***	0.181	1.935	0.788 ***	0.18	2.2	0.844 **	0.291	2.325
(base = male)									
Performed activity	0.767 **	0.28	2.154	1.105 ***	0.293	3.019			
(base = No)									
Driver/barrier									
Institutional	0.551 ***	0.132	1.735	0.571 ***	0.133	1.771	1.025 ***	0.191	2.786
Situational									
Dispositional	0.953 ***	0.148	2.592	0.811 ***	0.143	2.25	0.824 ***	0.252	2.281
Steps	6			6			5		
-2LL	741.381			749.694			384.884		
	$\chi^2 = 142.162, df = 4, p < .001$			$\chi^2 = 146.423, df = 6, p < .001$			$\chi^2 = 85.988, df = 7, p < .001$		
Nagelkerke R ²	.256			.261			.237		
Hosmer and Lemeshow Test	p = .137			p = .106			p = .104		
Classification accuracy	74.6%			74.3%			89.2%		

*** p < .001, ** p < .01, * p < .05, + p < .1

5.3 Value Creation in Relation to Development Activities

Teaching as a profession tends to involve activities that are aimed at developing the teaching of the subject contents. Two such development activities for VET teachers are working in *projects* with industry representatives, and *pedagogical development*. Table 10-11 present results from these two activities.

The final models for working in projects show that respondent's sex and performing the activity have a positive effect on perceiving high value creation, as have dispositional drivers. The reoccurrence of these confirms that they are central factors in the perception of high value creation. Teaching experience has a negative effect on perceiving high value creation, though it is significant only for those with longer than 8 years of experience. This negative effect may be the result of teaching experience supplanting the experience of projects, or of those with less teaching experience being more open, and valuing collaborations with actors outside school higher.

The final activity covered is pedagogical development, and dispositional factors are again retained in the models. Such factors have a positive effect for perceiving high value creation. Performing the activity has a positive effect for vocational knowledge, as it does for teaching. For networks, performing the activity is not retained while the respondent's sex is, where the effect is positive for female respondents. The pattern for this final activity is generally similar to that of other activities with dispositional drivers, sex and performance of the activity making positive contributions.

Results for overall development activities agree with the results from dispositional

drivers: respondent’s sex and performance of the activity are positive contributors, and retained teaching experience has a negative effect.

Table 10: Final logistic regression models for development activities: projects

	Projects								
	Vocational knowledge			Teaching			Networks		
	B	SE	OR	B	SE	OR	B	SE	OR
Constant	-4.735 ***	0.592	0.009	-4.844 ***	0.632	0.008	-5.218 ***	0.615	0.005
Teaching experience									
4-7 years				-0.396	0.247	0.673			
≥8 years				-0.555 *	0.217	0.574			
(base ≤3 years)									
Sex									
(base = male)							0.563 ***	0.176	1.755
Performed activity									
(base = No)	0.692 ***	0.173	1.998	0.591 ***	0.177	1.805	0.638 ***	0.175	1.892
Driver/barrier									
Institutional									
Situational									
Dispositional	0.851 ***	0.135	2.343	0.98 ***	0.14	2.666	0.957 ***	0.14	2.603
Steps	7			6			7		
-2LL	778.528			752.259			762.068		
	$X^2 = 83.638, df = 4, p < .001$			$X^2 = 93.820, df = 5, p < .001$			$X^2 = 90.768, df = 3, p < .001$		
Nagelkerke R ²	.164			.185			.178		
Hosmer and Lemeshow Test	p = .295			p = .420			p = .858		
Classification accuracy	70.7%			70.9%			70.5%		

*** p < .001, ** p < .01, * p < .05, + p < .1

Table 11: Final logistic regression models for development activities: pedagogical development

	Pedagogical development								
	Vocational knowledge			Teaching			Networks		
	B	SE	OR	B	SE	OR	B	SE	OR
Constant	-5.278 ***	0.658	0.005	-4.296 ***	0.565	0.014	-6.649 ***	0.859	0.001
Teaching experience									
4-7 years									
≥8 years									
(base ≤3 years)									
Sex							0.666 **	0.228	1.946
(base = male)									
Performed activity									
(base = No)	0.454 *	0.221	1.575	0.736 ***	0.197	2.088			
Driver/barrier									
Institutional									
Situational									
Dispositional	0.942 ***	0.149	2.566	0.836 ***	0.131	2.307	1.087 ***	0.191	2.966
Steps	8			8			8		
-2LL	709.447			813.19			518.296		
	$X^2 = 54.981, df = 3, p < .001$			$X^2 = 68.065, df = 2, p < .001$			$X^2 = 51.948, df = 2, p < .001$		
Nagelkerke R ²	.118			.135			.132		
Hosmer and Lemeshow Test	p = .303			p = .073			p = .138		
Classification accuracy	72.1%			66.3%			83.5%		

*** p < .001, ** p < .01, * p < .05,

5.4 Summarizing Value Creation

Overall, some factors that determine the perceived value creation from CPD activities are retained in the logistic regression models. Dispositional drivers are retained in all 24 final models, which leads us to conclude that individual drivers are a central component for perceiving a high value. Another factor that is often retained is respondent's sex, where females consistently perceive a higher value than males. However, it should be noted that there is an imbalance between sex and vocational area (Table 1), and sex was included in the models presented rather than vocational area, in order to avoid multicollinearity. Thus, the importance of sex should be interpreted with some care as the result is probably a consequence of not only of the respondent's sex but also of vocational area.

Performing a CPD activity is another factor that is often retained, and when retained it has a positive contribution. This suggests that performance of related activities is linked to the perception of value. This is as expected, since the experience of a CPD activity should be part of forming a value for the said activity. The results suggest that performing the activity generally has a positive contribution to a perception of value.

Some factors are frequently not retained in the final models. Interestingly, these are factors related to the training and experience of the teacher, both in teaching and occupational work. The effect that such factors have on the perception of high value, when seen, is generally negative.

6 Discussion

We have seen that individual factors are important for the perceived value of different activities for VET teachers' professional development concerning vocational subject-matter contents. But how can we understand the differences in perceived values? VET teachers have been described as (ideally) having a "double identity", being both a craftsman of a vocation and a teacher (Fejes & Köpsén, 2014; Nylund & Gudmundson, 2017). This study has focused on the vocational aspect of the identity and how to keep up-to-date. Value creation, however, is related to the "complete" identity of the teacher, and we have analysed values in relation to vocational knowledge, to the teachers' networks in industry, and to length of teaching experience. These different types of value are not separate but interrelated, as are the different aspects of the identity.

The results presented here show, in particular, that dispositional drivers are important for professional development, while institutional drivers generally have a weaker influence. The factors behind the dispositional drivers remain to be analysed in greater detail. Thus, it is possible to increase the opportunities for professional development among teachers by changes in the organisation of vocational education and training, and in this way exploiting the potential in teachers' agency identified by Vähäsantanen et al. (2008) to make the institutional factors important and create value among the teachers. These organisational changes should reduce barriers to boundary crossing between school and working life.

6.1 The Segregated Labour Market Reflected in VET

We have also seen that a teacher's sex is a factor that influences the perceived values. It is possible that dispositional factors differ between women and men, in addition to situational factors related to the family and different roles as a family member. Further analysis of these factors is beyond the scope of the present study. It is, however, necessary to question what the imbalance between vocational areas concerning female/male teachers (and workers) means for the results presented here. The imbalance may give rise to an interaction between the variables sex and vocational area that we cannot analyse in depth with the data we have available. Female and male VET teachers are over-represented in some vocational areas that are also traditionally segregated in the Swedish labour market.

As an example, female teachers are over-represented in the area of care. This raises the possibility of a complex interaction between different types of factor. The broad care sector includes child care, healthcare, and elderly care. These areas are not only dominated by female employees, but they differ from most other vocational areas in terms of learning and knowledge. More precisely, it is more common that the VET teachers in these areas have a higher educational level than the vocation for which they are training students. In most other areas in Swedish VET, the teachers come from the vocation for which they are teaching. Teachers in child care are typically pre-school teachers, and they are teaching child minders-to-be. Similarly, teachers in healthcare and elderly care are nurses and social workers, and they are teaching assistant nurses-to-be. Thus, all these teachers have studied in higher education for their initial occupation. This background of teachers may foster a different attitude to participation in activities that lead to professional development, when compared with teachers without higher education for their initial vocation. It is, therefore, reasonable to suggest that female VET teachers have a more positive attitude to the value creation of various learning activities. The influence of sex, vocational area and type of training among teachers, however, remains to be analysed and understood.

6.2 Influence of Experience on Teachers' Identities

A somewhat surprising finding is that the length of experience from the initial occupation has only a limited influence on the perceived value of different CPD activities. We have seen earlier (Andersson & Köpsén, 2017) that teachers with longer experience of the initial occupation are more likely to carry out at least one type of the boundary-crossing CPD activities that we analyse, and that they are more likely to cross the boundaries to the work-life practices to work there. However, the length of such experience does not have the same influence on the perceived values of the activity. A possible explanation appears when we consider the need of teachers to keep up-to-date in the industry. The requirements to be able to participate in working life and keep up-to-date are constantly developing, at different paces in different areas. All VET teachers will probably see the value of and need for CPD to remain up-to-date, independent of the length of their work-life experience. The latter, however, does affect the probability of actual boundary

crossing and participation.

Another finding is that the length of experience as a teacher also affects how VET teachers value CPD. Teachers with longer teaching experience are less likely to see the value of the types of CPD activity that we have analysed. This raises the question of how a teacher retains an identity from the initial occupation. Does long experience as a teacher weaken the connection to the initial occupation? This is not unlikely, and supports the conclusion that it is important for VET institutions to stimulate and organise teachers' CPD, for newcomers and for old-timers in the community of VET teachers.

6.3 The Effect of Participation on Value

The findings show that participation is important. Perceived value is clearly higher among those who had performed the different activities analysed. This confirms that it is important for VET teachers to have the opportunity to carry out various activities with "CPD potential" (Fraser et al., 2007). Institutional factors are important also here, especially for those teachers who do not have dispositional drivers strong enough to overcome institutional barriers, but still need competence development to do a good job in VET. Institutional factors may be particularly important for participation in longer-term CPD activities, which are more likely to create value in terms of changes in teaching practice (Boyle et al., 2004).

However, we should not take for granted that performing an activity is the cause, and the perceived value an effect. It is possible that carrying out an activity is the effect of a perceived value – VET teachers are probably more likely to carry out activities that they believe will have a positive influence on their professional development.

6.4 Reflections on Method

We have used a dichotomy of value creation (high/low), and this means that some nuance is lost. In reality, perceived value is a gradient, and our measure is rather coarse. Nevertheless, the study provides important insights in an area in which few studies have been conducted.

The properties we have studied leave some degree of variability in the perceived values unaccounted for, and other factors may be important. For example, the sociability of a teacher (e.g. ability to connect and create networks) may have an effect. The different levels of professionalism between different vocational areas may also have an effect. We have only discussed the influence of area segregation with regard to sex, and its possible interaction with educational background, but other factors depend on differences in practices between vocational areas.

Future studies should develop the instruments to include other factors not covered here. This exploratory study was limited to a pre-defined set of activities that we believed contributed to VET teachers' professional development, and a number of pre-defined factors that we believed influenced the perceived values of such activities. Other activities and factors are important in understanding the complex pattern of CPD among

VET teachers. This quantitative study is part of a larger research project (see Andersson & Köpsén, 2015, 2017; Köpsén & Andersson, 2017). Forthcoming findings based on interviews with VET teachers will probably provide deeper insights into specific aspects of the topic. Here, we measured three types of possible value of the different activities. To distinguish and highlight different aspects of the value of CPD, and what is valuable for the work of a VET teacher, helps us to understand CPD from one perspective. Further studies will view the topic with a more holistic perspective, and in this way achieve deeper understanding.

7 Conclusions

We have analysed several types of CPD activity to find out their value for teachers' vocational knowledge, ability to teach, and networks. These three components of VET teachers' professional action are important and interrelated. In order to work as a VET teacher, it is necessary to have a connection to a professional network, knowledge of how to perform the tasks within the field, and an ability to teach. Thus, all three are different "expressions" of what it means to be a VET teacher. As such, many CPD activities may contain components of all three values. For example, the most common of the activities we have analysed is reading. And while it is clear that reading can increase knowledge in the context of the community of practice of the vocation, it is connected also to the ability to interact with professionals active in the field, and to stimulating reflection on what and how to teach a subject.

Dispositional factors are significant, and this leads us to discuss the significance of this for the VET teacher identity. To what extent do the respondents identify as a teacher in a vocational subject, and to what extent as a vocational practitioner who teaches? This is a crucial question in the potential dual professional identity of VET teachers (Fejes & Köpsén, 2014). The present study focuses on one side of the coin – the professional competence and identity related to the teachers' initial occupation – but the analysis shows that the two sides are intertwined. It is not a matter of being a vocational practitioner or a teacher – but of being, remaining, and developing as a boundary-crossing and bridge-building *vocational* teacher (Maurice-Takerei, 2016).

The community of teaching is crucial for this to happen (Lloyd & Payne, 2012). The way in which the work in school is organised, and how contacts with practitioners within the vocational practices outside school are maintained and structured are important. The teacher is presently the driver for maintaining and building these connections through various types of boundary crossing and activity. Other actors in school and working life, however, can enable the professional development of VET teachers through measures that create CPD value among them.

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Book Review: History of Vocational Education and Training in Europe

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Book Review

History of Vocational Education and Training in Europe: Cases, Concepts and Challenges, edited by Esther Berner and Philipp Gonon, Peter Lang, Bern/Switzerland, 2016, 599 pp., ISBN 978-3-0343-2120-4, about 127€.

The book is volume 14 in the series *Studies in Vocational and Continuing Education*. Series editors are Philipp Gonon & Anja Heikkinen. Volume 14, *History of Vocational Education and Training in Europe: Cases, Concepts and Challenges* is edited by Esther Berner, Professor for Educational Science, Helmut-Schmidt University in Hamburg, Germany, and Philipp Gonon, Professor for VET and Teacher Training, University of Zurich, Switzerland.

Scope and Context

The book consists of 29 chapters written by 38 authors. The overarching purpose is to provide a historical context for the development of vocational education and training (VET)-systems in Europe as this will aid in cross-country comparative studies where lack of historical context can lead to inaccuracies in comparisons. The basis for the contents are presentations given at a 2014 conference in Zurich with the same title as the book as well as some further chapters to provide a fuller picture. The VET systems covered by the book are: Austria, Denmark, England (and UK), Finland, France, Germany, Italy, Lithuania, Norway, Spain, Sweden and Switzerland, some once others in multiple chapters from different perspectives. As the subtitle reads, it is divided into three parts: concepts, cases and current challenges. **The first part** on concepts covers 11 chapters

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discussing different national approaches to VET from a historical perspective. **The second part** on cases covers 10 chapters that consider, in a more detailed manner, regional and/or national developments in a specific field as well as some comparative studies. **The third part** consists of 7 chapters on current challenges and discuss these from a historical perspective.

Concepts

The first contribution to this part has been written by **Eric Verdier**. It is a comparative study on systems of lifelong learning in France, Denmark and Great Britain as they have come to be influenced by the EU and OECD. In particular, he identifies four different conventions or systems of guidance in lifelong learning. One academic convention focusing on assigning individuals to existing educational pathways with a hierarchy that promotes academic achievement. One Neo-corporatist convention where the paths of lifelong learning are organized more through the labor market. One universal convention where social justice is an important component leading to a far-reaching integration of the vocational and the general. Finally the organized market convention where lifelong learning paths are mostly up to the individual to arrange. The comparisons then demonstrate that in practice countries have different hybrids of these conventions with the accompanying tensions.

The next chapter by **Esther Berner, Philipp Gonon and Christian Imdorf** looks at the origins of the Swiss VET system beginning in the late 19th century. It explores the different trajectories of the cantons Lucerne and Geneva where in the former a system of dual-VET established itself whereas in the latter a fully school-based system took hold parallel to a dual one (a dual system being some form of VET located mostly in firms but also at schools). The conclusions are that different justifications prevailed in the two cantons based on the political and economic situation at the time. In Geneva a stronger emphasis on the civic aspects of VET contributed to the establishment of school-based VET but owing to economic constraints a parallel dual-system also took root. There was no comparative political drive towards the civic in Lucerne leading to a more complete dominance of a dual system.

The third chapter by **Marius Busemeyer** is a comparative study exploring the different trajectories that VET reforms have taken post-WWII in Sweden, Great Britain and Germany. Busemeyer argues that all three countries began from similarly organized VET systems but developed in very different ways owing to differences in the capitalist economy as well as in postwar politics. The main conclusion is that we benefit from a deeper knowledge of how economic and political influences shape VET in our striving to understand different national systems. This is highlighted by the differences in educational politics pursued in Germany by the conservative Christian Democrats and in Great Britain by the likewise conservative, but secular, Tories.

The fourth chapter by **Philipp Gonon** discusses the development of Swiss VET within the theoretical context of path-dependency oriented historical research and the critical junctures that have shaped Swiss VET. A particular focus is the rise of the Federal

Vocational Baccalaureate in the 1990s which is explored more extensively as a critical juncture. The conclusions demonstrate that the critical junctures identified in the study are congruent with a path-dependency approach but create a layered system where, at each critical juncture, significant elements are added or modified in the institutional structure of VET.

The fifth chapter by **Mathias Götzl and Thilo Ketschau** is an analysis of the development of the Commercial School of the Trade Hall in Gotha, Thuringia between 1817 and 1902. With their analysis the authors demonstrate how the analytical use of theories and models of organizational sociology as well as neo-institutionalism can be profitably combined with the bottom-up approach of considering the development of a specific school. In contrast they argue, a top-down holistic approach would run the risk of failing to consider particular issues and problems relevant to the general development of VET at the time.

The sixth chapter by **Lorenz Lasnigg** explores the historical reasons for the remarkable stability of the Austrian VET system across different regimes. Through considerable political change it has retained a dualistic character with parallel apprenticeship- and school-based VET organizations that operate more or less independent of each other. Most of the changes found in the two VET systems can be attributed to a kind of “muddling through” where small-scale decisions have slowly shifted the institutions without drastically and extensively reorganizing them. It concludes with a discussion on the relationship between the importance of critical junctures and small step pragmatic decision making in institutional change, questioning the strong divide between them in much theory.

The seventh chapter by **Eveline Wittmann** considers the development of vocational school policy in Germany. It uses a theoretical approach based in the concept of “legitimacy” in order to explore how the German state used its vocational school policy for these ends in particular when confronted with international frameworks such as the EQFs. It concludes that many school reforms can be understood as reactions to a contested legitimacy stemming from pressures outside of the nationstate.

The eighth chapter by **Åsa Broberg** focuses on the transition from work-oriented VET in early 20th century Sweden to school-oriented VET after the reform of 1971. It is argued that this can be understood in part as the shift between two figures of thought: work and school. These contain several polarities on the conceptual level which lead to changes in practice. This shift, it is concluded, is a pedagogical rather than institutional change, both systems being largely school-based and thus it is important to pay attention not only to institutional changes in VET reforms but also the pedagogical-conceptual changes that take place.

The ninth chapter by **Esther Berner** discusses two practices of subjectification in VET, selection by testing and training, in early 20th century Germany and Switzerland, from a Foucaultian genealogical perspective. Comparisons are made between the Taylorist and Fordist practices post WWI and contemporary neo-liberal discourses on employability concluding that some elements of discipline remain similar between then and now whereas the main character has shifted significantly from its Taylorist form to today’s focus on flexibility, individuality, teamwork, etc.

The tenth chapter by **Manfred Wahle** presents an argument for using more images in historical VET research. Using a series of paintings and photographs of early industrial work Wahle exemplifies this argument reaching the conclusion that we have, until recently, relied mostly on written documents in research and this could receive significant enrichment through the inclusion of images.

The eleventh chapter by **Anja Heikkinen** is a comparative study of VET in Finland, Great Britain and Germany in the period of the 1860s – 1960s. With this comparison the aim is to consider how competing views on the purpose of VET, as something contributing to livelihood, knowledge or companionship, have shaped the trajectories in the three countries. The main argument drawn from these comparisons is the need for shared research where the drive towards universalizing monologues in descriptions can be overcome.

Cases

In the section on case studies the first chapter by **Elizabeth Flitner** considers the German influences on the perception of apprenticeships in France during the Vichy regime. It is shown that the period experienced large shifts in VET policy that have not been sufficiently researched in order to examine their impact on the low-status that apprenticeship-forms of VET have to this day in France.

The second chapter by **Gérard Bodé** is a comparative case study between German and French VET systems in the period of 1860 – 1940. In this chapter Bodé discusses the processes behind the repeated French policy of the period of borrowing from German VET models. It is shown that this was done into a different more state-centric institutional structure and with the express purpose of legitimizing policy decisions already made. This largely contributed to the failure of models borrowed from Germany.

The third chapter by **Antoine Vernet** is a case study of how economic crises during the 20th century have provided an opportunity for state intervention in French VET with the purpose of having VET contribute to the solution of these crises. It is suggested that this way of using VET has also contributed to its low status in the country.

The fourth chapter by **Christian Helms Jørgensen, Svein Michelsen, Jonas Olofsson and Daniel Persson Thunqvist** is a comparative case study of how the VET systems in the three Nordic countries, Denmark, Norway and Sweden came to develop between ca. 1850 and 1945. The three countries have developed substantially different systems, particularly when it comes to the role of apprenticeships and it is shown how these different trajectories depended heavily on the initial position of labor market organizations as well as on the degree to which vocational schools were established in the beginning of the period.

The fifth chapter by **Marja-Leena Stenström and Maarit Virolainen** deals with the development of the Finnish VET system from 1809 until today focusing on the development of a school-based VET system and the various consequences that this has had. In particular, they consider the comparative parity of esteem that has developed in Finnish society between VET and general upper secondary education.

The sixth chapter by **Svein Michelsen** consists of a case study on the origins and early development of Norwegian VET between 1860 and 1930. The study pays particular attention to the various issues dividing stakeholders regarding its organization owing mainly to disagreements among business leaders and the inability of the strongly *laissez faire* political system to deal with this.

The seventh chapter by **Tobias Karlsson, Fay Lundh Nilsson and Anders Nilsson** is a case study from the Swedish VET context where two recent reforms, the new apprenticeships and the *Teknikcollege*, are compared. The discussion centers on the historical reasons for why the former has not been successful whereas the latter has met with more positive outcomes. The main arguments are that apprenticeships historically have been marginal in the Swedish VET context in contrast to the *Teknikcollege* which can look back at similarly organized initiatives from earlier in the 20th century.

The eighth chapter by **Lorenzo Bonoli** is a study of the Swiss VET system and the process of implementing statistical overviews of its functions. It is argued that both the youth of statistics as a field of expertise as well as the initial difficulties with defining basic categories of VET like “apprenticeship” owing to a lack of clear regulation contributed to this.

The ninth chapter by **Philipp Eigenmann and Michael Geiss** is a case study on how apprentices articulated their needs and aspirations within the Swiss VET system between 1950 and 1980. It is demonstrated how associations, unions and official agencies all served to undermine the autonomous articulation of interests by apprentices. At the same time the apprenticeship system was under constant public scrutiny, something that still led to solutions being proposed for various issues albeit in a paternalistic way.

The tenth chapter by **Chiara Marinelli** is a study investigating the history of the industrial and artistic industrial schools in Italy between 1861 and 1913. The study provides a foundation for comparisons with how other VET systems developed in Europe at the time showing the relative ambition of the Italian institutions but also their low enrollment rate as well as the absence of working-class people in their classes. It is suggested that the failure of these schools might have two causes, one being knowledge of better alternatives for VET and one being the lack of diplomas that these institutions could give out. Opt

Challenges

In the section on challenges the first chapter by **Friedhelm Schütte** discusses the current state of research on the history of VET. One important reason for this is that transfer of VET systems from one country to another need to take into account the historical contexts within which they developed and this in turn requires an understanding of what historical research needs to cover. From this review a few important issues are highlighted. We need more research that analyses educational systems as a whole, this research needs to incorporate wider theoretical frameworks that take into account social, cultural and educational aspects capable of transcending domain-specific characteristics. There are also several methodological needs listed; international comparative

studies, oral histories, biographical research and discourse analysis.

The second chapter by **Simone Haasler** looks at the gender segregation in the German labor market from a historical perspective. Based on a series of interviews with 24 German women aged 30 – 57 regarding their professional and educational careers it is demonstrated that the historical pattern of welfare- and other social as well as educational policies has created institutional habits that are difficult to break.

The third chapter by **Håkon Høst** also has a gender-based perspective. Its focus is the historical development of VET in health and social care in Norway, looking at the changes that have followed from its transition from a school-based program to an apprenticeship-based one. Being the largest of the VET programs this has contributed to significant changes in the collective skills system compared to the traditional industrial and artisanal apprenticeships. Still, major differences remain where employers play a comparatively passive role in health and social care apprenticeships and where the training leads to assistant positions with low autonomy and prevalent part-time work.

The fourth chapter by **Andreas Saniter and Vidmantas Tutlys** is a comparative study of the developmental pathways in initial VET in Lithuania and Germany. The study demonstrates the challenge of systems-transfer, in this case the dual system from Germany to Lithuania in the 1990s owing to differences in institutional development from the late 19th century onward. The conditions of the origin of the German apprenticeship system are shown to have been largely absent in Lithuania and it is argued that one of the main challenges in Lithuania is creating a similar tri-partite corporatist structure as that which prevails in Germany with powerful and self-confident employers' organizations, trade unions and chambers.

The fifth chapter by **Linda Clarke and Jörn Janssen** is a comparative study that focuses on the reasons why the VET systems in the post-war construction sector diverged in Britain and the Federal Republic of Germany. This, it is argued, rests largely on the very different nature of wage relations in the two countries. The consequences being that in the FRG qualification levels were linked to wages whereas in Britain the wages were increasingly unregulated and indifferent to skills and qualifications. The conclusions are that although both systems face challenges in today's globalized world, Germany seems better equipped to handle these than Britain because Britain lacks public institutional infrastructure for research, organization and supervision in order to restructure VET.

The sixth chapter by **Ana-Inés Renta-Davids and Manel Fandos-Garrido** is a historical study of the Spanish move from a predominantly school-based to a predominantly work-based VET system. Included is also an analysis of the efficiency of the VET system leading to a discussion of the main challenges it faces going forward: attracting students, engaging social agents and improving quality outcomes.

The final chapter by **Bettina Siecke** is a historical study of two-year training occupations in Germany, as distinct from the more common three years of the dual system. These shorter training options aiming at students with comparatively low school achievements are analyzed from the perspective of lifelong learning and permeability, ie. access to further education and qualifications. It is shown that continuous development has widened the scope of permeability but that challenges remain primarily because of companies' selection principles.

Conclusion

The book has an impressive scope, covering macro-perspectives as well as micro-perspectives on the history of VET in Europe. A significant number of chapters are also comparative giving the reader a good view of the contrasting VET systems in Europe and the historical processes that have contributed to this diversity. Several of the cases demonstrate clearly how dependent the VET system of a country is on political and economic conditions and how difficult it can be to effect changes without taking this into account. Several cases also point to the impact that cultural and conceptual conditions in a country can have on the development of VET. Together these provide a rich description of the complexity involved in the development of educational systems. A number of cases also focus on specific elements in a country's VET thereby demonstrating how diverse vocational education often is when one looks beyond the generalized descriptions in many publications with such a wide scope as this one.

The anthology format and broad focus on principles, cases and challenges presents the reader with an unusual plurality of historical methods and perspectives as well as research aims. This makes the publication doubly valuable, both as a guide to the history of VET in Europe and as an overview of historical research including its varying methods and current issues. Simply summarizing the many suggestions and calls for further research provides one a significant insight into the future potential of historical studies.

As an anthology its plurality of voices also serve to avoid the critique launched already in the 1930s by Ludwik Fleck that handbooks written as monographs often aim at a critical synopsis that masks some of the multiplicity found in scientific journals. The variety of perspectives in this anthology supports the reader in developing an understanding for European VET that is not simplified. This does come at the cost of some coherence and ease of reading but is well worth it. For a scholar or student wanting to get a broad view of the history of VET in Europe including the various ways that historical research can contribute to our understanding of contemporary issues in VET the volume is indispensable.

Biographical Note

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Social Dimensions and Participation in Vocational Education and Training: An Introduction in the Special Issue

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Introduction

After the first “Crossing Boundaries in Vocational Education and Training - Conference” took place in Bremen in 2015, organized by the ITB, the conference focusing on the social dimension and participation was continued in Rostock in August 2017 at the ibp in collaboration of Michael Gessler, Larissa Freund (ITB Bremen) and Franz Kaiser, Susann Krugmann (ibp Rostock). The thematic focus on the social dimension and participation takes place in many areas of life and is of decisive importance for decision-making and decision-making processes. Particularly in times of structural change and the associated transition to a service and knowledge society, it is evident that operational structures are changing and being reorganised. The internationalisation of the economy is also progressing in this way, leading to increasing demands on the level of qualifications (Wilkins & Leber, 2003). It is precisely because of this development that the sociology of work and industry demands more or less immanent participation (Brater, 2010). So that the question of why should not actually arise if we assume that employees should develop further. In general, participation is a key subject of democratic societies, understood as a multi-layered, interlocked and highly dynamic process and less as an achieved, fixed state. In this context, changed focal points are relevant for the different areas of society, since these take into account both individual and collective or institutional activities of subjects or cooperation between groups of persons or institutions. The predominance of a relationship of trust and reliability within society is fundamental. Only if the different actors can create an encouraging climate of mutual trust will it be easier to develop a

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social and participatory attitude towards the new and the foreign. Participation thus requires a high degree of initiative, courage, openness, willingness to take risks and creative commitment, and opens our eyes to the challenges of social dimensions in the vocational training context.

This approach is in the tradition of educational enlightenment, combined with Immanuel Kant's request "Have the courage to use your own intellect" and the critical thinking of the Frankfurt School, in search of the expansion of individual possibilities for the development of one's own life under contradictory circumstances. The individual should be encouraged to develop himself and for society. The focus is on various questions. How can vocational training benefit individual learners and their interests and at the same time meet the requirements of a division of labour economy with an interest in special competences? How can vocational training enable trainees to analyse the structure of vocational training and their professional future? How can they be encouraged to deal with the contradictions and develop innovative design possibilities in their workplaces with their colleagues and managers? What is necessary in the design of VET systems to integrate different learners and provide them with ways to achieve their aims? What does this mean for VET research?

For this reason, we have invited scientists from different countries and various fields of vocational education and training and related disciplines to participate in the conference and give lectures on the following reference levels.

Boundaries defining and shaping the field of initial and continuing vocational education and training:

Systems

Socio-culturally different vocational training systems have developed conceptually. The comparison of different qualification systems and the management of vocational training systems are of theoretical and practical importance in the context of economic development and international cooperation. The comparison enables the identification of strengths and need for improvement and the identification of gaps. In a comparative perspective with regard to the current situation and the necessary/possible development directions of the respective systems, the question arises of promoting educational justice and a successful transition to the labour market.

Institution and Agency

The various vocational training systems are defined by the interaction of the involved institutions, stakeholders and participating individuals. These are not only an expression of professionalization, but also show the system boundaries and interfaces. These inter-institutional spaces of open or closed discourses, depend on the regional and national culture and the political models of the cooperation partners. Which rules have been established? How do educational institutions and labour institutions communicate and interact? Which cooperations and transitions are possible or necessary to increase participation?

Practice and Actor

Practices have been established in the institutions or regulations to deal with the central issues of teaching, learning and competence development. Teaching and learning practices can help to lower the boundaries of qualifications and employment biographies. What does it take for teacher training, student collaboration and research itself to cross institutional boundaries or focus on central conflicts and contradictions to encourage individuals to face them? How can the goal of education in vocational education and training didactics and the culture of interaction be ensured? What are the different formal and informal practices, how do they relate to each other and what developments are discernible for social inclusion and the public welfare?

The three reference levels were influenced by conceptual ideas, terms and constructs. In 2017 we focused on conceptual ideas and structural approaches that help to cross the borders of democratic society with well-trained and self-confident employees and sustainable development. Therefore it was discussed which developments have emerged and which of them are suitable for future requirements and the specific history of their region?

In order to provide the conference with a corresponding framework, we have invited representatives keynote speakers from various research areas to address these questions as part of their work. As keynotes we could win Stephanie Matselang Allais (South Africa), Sabine Pfeiffer (Germany), Markus Neuenschwander (Switzerland) and James Avis (United Kingdom).

This Special Issue of the Crossing Boundaries Conference focuses on the social and participatory dimensions of vocational education and training. Stephanie Matselang's critical contribution about the labour market outcomes of National Qualification frameworks has already been published in another journal and is therefore not included in the Special Issue. A short version is included in the proceedings of the conference (Kaiser & Krugmann 2017). She stated the absent of empirical evidence of benefit of NQFs to the labour market, the employers and employees based on her, six countries including study.¹

James Avis' contribution entitled *Crossing Boundaries: VET, the Labour Market and Social Justice* fundamentally analyses the connection between vocational education and training, the labour market and social justice against the background of criticism of capitalism and changes on the labour market.

The orientation of vocational education and training towards the management of work processes is linked to the competence discourse, which provides for different narrow or broad qualification profiles. The design of the associated educational pathways and qualification structures is a continuous political process of negotiation in the tension between capital and labour. Recently, neoliberal tendencies have taken place in both Sweden and Germany, which have made new low-wage sectors and labour intensification possible, for example. Vocational training is described by Avis as "contested terrain".

¹All contributions of the keynote speakers are also in the 2nd proceeding of the Crossing Boundaries: Social Dimension and Participation. The only exception is the keynote by Prof. Markus Neuenschwander.

He is focussing England's situation about qualification with a simultaneous skills gap. The neoliberalist thinking that strengthened in England associated with Margaret Thatcher has spread to continental Europe and has nested in common sense. It leads to acceptance of social and regional inequality. The effects of digitisation and the global networking of work also vary from region to region and are currently affecting university graduates and knowledge work in particular. At the same time, studies of wage developments for work always ignore unpaid work. The problem is that by linking vocational training and the labour market, the development of qualifications for this socially valuable work remains outside the field of vision. Avis fears that the increasingly liberated international market movements will have devastating consequences for the employment and integration services of the economy, which cannot be countered with reformism to harmonize life chances under the illusion of meritocracy. In contrast, he emphasizes a Marxist position aimed at a post-capitalist society.

If vocational education and training is to develop more strongly into democratic and humanistic education, this will not only start with the content, but also with the form in which trainees are taught in vocational schools. This is the starting point in Franz Kaiser's article entitled "*Theme Centered Interaction in Critical Vocational teacher education*", which calls for a stronger focus on the qualification of prospective teachers at vocational schools.

Starting from the changed requirements in the working world and a shift from acting according to instructions to acting independently and the increase of individual responsibility in the working world, he clarifies the contradictions in vocational education and training by claiming the critical theory of the Frankfurt School and its goals for vocational education and training.

The humanisation of the working world, which has taken place in Germany since the 1970s, also requires a change in vocational training in which social skills are also developed as the ability to resist. He sees the theme-centred interaction as a starting point for this, making it easier for future vocational school teachers to focus their teaching more on the independent development of their students. The reflection of one's own biography and the unconscious adoption of values and behaviour associated with the path of life should thus be made more accessible to one's own reflection. In communication situations that permit and promote authentic encounters and interactions, this can be learned during the course of study and can thus contribute to an emancipative vocational training.

The article thus clarifies the question of the practical development of participation through the implementation of a method that teaches participative and creative teaching design and is at the same time founded in values that give the individual opportunities for growth and at the same time take into account the interests of all and nature.

In contrast, Sabine Pfeiffer's contribution looks at the activities of employees in highly automated and digitized work environments and discusses the potential of automation through new technology (industry 4.0) in manufacturing and the automotive industry. She shows in her article *The future of employment on the shop floor: Why production jobs are less susceptible to computerization than assumed* the differences between routine work and non-routine work through qualitative research and focuses on the relevance of

non-routine work especially in highly automated and digitized work environments.

Previous research shows two decisive effects in this context when a highly automated and/or digitized work environment is created: Substitution effects (routine tasks are automated) and complementarity effects (support for non-routine tasks). Pfeiffer criticizes that these categories are used to estimate the replacement of human work and to give a probability prognosis of the replacement. Her study focuses on the relationship between the subjectivation of work performance and the ability to survive. She combines the concept of subjectifying work action and the concept of living labouring capacity and assumes that a combination of qualitative diagnoses of human-machine interaction with quantitative labour market data provides insights into probable future developments in work organization. The aim is to improve methods for investigating relevant developments and to create a basis for continuous and early reporting on changes in companies and workplaces. At the end, she develops an index (LC index) that collects “living capacity for work” rather than routine work.

The contribution by Markus Neuenschwander, Jan Hofmann, Andreas Jüttler and Stephan Schumann focuses on the career aspirations and career choices of students at secondary school in Switzerland. The article *Professional Desires and Career Decisions: Effects of Professional Interests, Role Models, and Internship in Lower Secondary School* focuses on the effects of vocational interests, exemplary occupations and the internships completed with regard to the implementation of the career choice. In order to be able to present the effects, a standardised questionnaire was developed and used in grade 7 and grade 9 (longitudinal study).

Based on the career decision model, the authors assume that the career decision of pupils results from the vocational goals that correspond to the vocational interests. In addition, the decision is centrally influenced by reference persons (e.g. role models such as parents, relatives, friends and others). So that pupils only indirectly have professional experience of their role models. The aim is to determine the extent to which the desired vocational environment is realised in the chosen training and how these findings can be predicted. It is assumed that career aspirations are more likely to be realised in the same environment if the first internship completed has a positive connotation. If the internship is assessed as negative by the students and they also receive negative feedback, they explore other professional environments that fit their interests and competences.

The study shows that there is a significant correspondence between the professional environment of the role models and the desired and selected training occupation of the pupils. This also applies to the relationship between the professional environment of the traineeship and the desired and chosen training occupation. With its results, the study emphasises that both direct and indirect experiences of the pupils flow into the career aspirations and career decisions. Thus it could be proven that the social-cognitive career theory of Lent et al. (1994) is suitable to explain the influence of the role models and to make a prediction on the pupils' occupational environment that has so far only been theoretically assumed.

What links the four contributions together is their critical and conceptual view on different fields and reference levels of vocational education. There is the level of political discourse and shaping structure (Stephanie Allais-Matseleng, James Avis) where VET

research can offer a critical reflection towards aims and evidence. On the level of practice research we can analyse career decisions (Neuenschwander et.al.) and how to encourage VET teachers to create participative lectures and social inclusion at VET schools (Kaiser). And at the same level the insight in Work 4.0 and the possibilities to strength living capacity for work (Pfeiffer).

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Crossing Boundaries: VET, the Labour Market and Social Justice

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Abstract

Purpose: The paper explores the relationship between vocational education and training (VET), the labour market and social justice in the current conjuncture.

Approach: The paper adopts an approach rooted in critical policy analysis. It consequently sets the discussion within the wider socio-economic and political context. Such an approach enables an exploration of the changing nature of waged labour in current conditions.

Results: A critical policy analysis facilitates a discussion of the labour process, waged labour and its intensification. At the same time these processes are allied to the effective expulsion and marginalisation of particular groups of workers from employment. Importantly, such processes need to be placed in their localised and spatial context within particular social formations.

Conclusion: Equity models of social justice that emphasise equal opportunities, are restrictive and can be contrasted with equality models which have a more expansive and philosophically rooted understanding of justice. The paper through its examination of the salience of VET in the current conjuncture as well as its significance for a post austerity democratic and radical politics, argues for a relational analysis that seeks to interrupt the patterns of inequality precipitated by neo-liberalism.

Keywords: VET, Vocational Education and Training, Neo-Liberalism, Labour Market, Surplus Labour Curriculum Development

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1 VET, the Labour Market and Social Justice

This paper raises a number of questions concerned with vocational education and training (VET) and its relationship to social justice. It commences by unpacking the notion of VET and then addresses the relationship between VET and the labour market. It considers post-capitalism in relation to debates concerned with jobless growth and surplus labour. Neo-liberalism, the politics of austerity and capitalism serve as a backdrop to the paper. It is important to acknowledge that processes that occur within a particular social formation cannot be thought of outside global, regional, national and indeed, local relations. Such boundaries are both fluid and permeable, being interrelated and are potentially in flux.

I would like to start with two of my favourite quotes both of which raise questions about the way in which think about VET, the labour market and social justice. The first is from Allman, McLaren, and Rikowski, and the second from the English Commission on Adult Vocational Teaching and Learning.

Education plays a key role in the perpetuation of the capital relation; this is the skeleton in capitalist education's dank basement. It is just one of the many reasons why, in contemporary capitalist society, education [*and we might add VET*] assumes a grotesque and perverted form. It links the chains that bind our souls to capital (Allman et al., 2003, p. 149–150).

This quote is salutary and reminds us of the relationship between education the wider economy, offering a corrective to those accounts that too readily associates VET with social justice (Wheelahan, 2016).

The second quote is from the Commission on Adult Vocational Teaching and Learning (2013, p. 5).

The best vocational teaching and learning combines theoretical knowledge from the underpinning disciplines (for example, maths, psychology, human sciences, economics) with the occupational knowledge of practice (for example, how to cut hair, build circuit boards, administer medicines). To do this, teachers, trainers and learners have to recontextualise theoretical and occupational knowledge to suit specific situations. Both types of knowledge are highly dynamic. So individuals need to carry on learning through being exposed to new forms of knowledge and practice in order to make real the **line of sight to work** (Commission on Adult Vocational Teaching and Learning).

Whilst superficially the *Commission's* position appears progressive it reflects a somewhat restrictive model of VET, being preoccupied with a clear *line of sight to work*. Such an orientation can very easily lead to a narrow focus on the needs of employers. To the extent that creativity and innovation is encouraged and valued this is on the basis that it contributes to successful workplace practices. Critique is encouraged provided it rests

within this terrain and is ‘business facing’, having *a clear line of sight to work* – that is to say, waged labour.

Much the same critique could be applied to models of competency, whilst recognising that this much like VET, is a contested and chameleon like term.

‘Competence’ is the capability of a person (or an organisation) to reach specific achievements. Personal competencies comprise integrated performance-oriented capabilities, which consist of clusters of knowledge structures and also cognitive, interactive, affective and where necessary psychomotor capabilities and attitudes and values, which are required for carrying out tasks, solving problems and more generally, effectively functioning in a certain profession, organisation, position or ‘role’ (Biemans et al., 2009, p. 267–268).

This echoes Fuller and Unwin’s discussion of expansive and restrictive learning environments in which some workplaces have cultures that facilitate expansive learning cultures whilst others are more restrictive (Evans et al., 2006, p. 61, Figure 3.2).

There is also an affinity with Winch’s discussion of the German notion of ‘Kompetenzen’, which suggests a broader understanding of competence than that found in Anglo-Saxon societies. For Winch:

[Kompetenzen] is more than a bundle of skills, but is unified through a conception of agency which involves planning, control, co-ordination, self-monitoring and evaluation, as well as the performance of a variety of tasks requiring specific skills. It also includes the ability to appreciate the broader economic and civic implications of occupational action (Winch, 2012, p. 179).

There are two points to be made. Firstly, “the ability to appreciate the broader economic and civic implications of occupational action” goes beyond Anglo-Saxon, restrictive and narrow definitions of competence and importantly, serves as a critical resource. At the same time, it readily lies within a specific socio-economic context that accepts capitalist relations. At best this resonates with social democracy, or more precisely in the German case, with Christian Democrat versions of Corporatism – or what Bosch and Kalina (2016) refer to as the Bismarckian welfare state.

Secondly, Thelen and Busemeyer (2008; 2011) point to what they refer to as the shift from collectivism to segmentalism in German VET.

In collectivism employers were encouraged to over train thereby producing workers with broad and portable occupational skills whereas in the latter training is organised around internal labour markets and the specific needs of the companies concerned (Thelen & Busemeyer, 2011, p. 69).

However, it is important to recognise that such relations are not fixed but are on-goingly reconstructed and negotiated. The point is VET is always set within socio-economic and historical conditions, with the shift from collectivism to segmentalism reflecting a change in the balance of power between labour and capital. This also aligns with the

competitive strategy of particular firms who respond to the broader context in which they are placed, the particular institutional complementarities (Kenworthy, 2004) as well as the specificity of the accompanying institutional and partisan politics (Busemeyer, 2015; Thelen, 2014).

We could think about the way in which social democracy has been undermined by neo-liberalism. Sweden would be a case in point and illustrates the impact of neo-liberalism upon a specific social formation and the way in which social democratic concessions have been eroded. Much the same questions could be raised about German corporativism. Harvey (2014, p. 158–159) amongst others have commented on wage repression in Germany in the early years of the 21st century. In 2008 Solow commented on the significance of low waged work in Germany, with the International Federation of Red Cross and Red Crescent Societies (IFRC) commenting

Even in Germany, almost 600,000 working people had to ask for additional benefits to pay their bills in August 2012 (International Federation of Red Cross and Red Crescent Societies, 2013, p. 20).

Relatedly, Brown, Lauder and Ashton (2011) have commented on the importance of international flows of labour in the skill strategies of organisations which reduce training costs. Such processes are allied to the hollowing out of the class structure, a shrinking middle class, the significance of mini-jobs, the encroachment of work upon our lives related to the intensification of labour and increased levels of exploitation and precariousness. These processes have to be set within German neo-mercantilism's concern with an export led growth regime and its particular relation to the management of the Euro so as to secure competitive advantage (Jessop, 2015, p. 17-18). In addition, Thelen (2014, p. 13–14) touches on both the importance of flexibilisation as well dualization, whereby core workers are covered by collective agreements alongside an unorganised and unregulated periphery. It is important to acknowledge that VET through its very construction and accompanying social relations lurches towards a form of labourism. In 1983 Ralph Miliband, described this as “an ideology of social reform, within the framework of capitalism, with no serious ambition of transcending that framework” (p. 293).

Notwithstanding its contradictions, the point I am trying to make is that VET is a contested terrain and whilst within specific constructions progressive possibilities reside these are dependent on the particular context in which they are placed. For example, expansive version of VET that embraces notions of citizenship, democracy and individual development are conditional upon the balance of power between labour and capital present within the social formation, and indeed beyond (Fuller & Unwin, 2003). In the latter case it is important to acknowledge the global context in which this may occur, one in which certain social formations and groups of workers are privileged over others.

2 Neo-Liberalism, Regional Inequalities and Globalisation

Here I address the relationship between VET, the labour market and social justice. The starting point is with the UK and in particular, England as a case in point. This is a

social formation marked by under- and unemployment and a labour force that is both over educated and over qualified. Within this society, there has been a hollowing out of the middle class and an increasing polarisation of income and wealth allied to increased precariousness of employment. The current fear is that these features will be exacerbated by globalisation and the consequences of Brexit.

There was a time when experts argued the English labour force was under-skilled and in need of up-skilling. Currently the rhetoric is that people have developed the wrong skills which is reflected in the notion of a skills gap. This debate is not restricted to England but has a wider purchase in relation to the way in which we think about the labour market and social justice. The above characteristics could be seen as a feature of liberal labour markets or as Esping-Andersen suggests, a liberal welfare regime. Notably Esping-Andersen (1990) suggests there are three broad versions of welfare regimes, the liberal, the social democratic and the corporatist, with these being set within very particular pattern of institutional and societal arrangements.

Esping-Anderson associates the Anglo-Saxon societies to the liberal welfare regime. However, it is important to acknowledge that in the years immediately following the end of the second world war, it would not have been too fanciful to describe an English social democratic welfare regime or settlement (Education Group, 1981). This settlement was interrupted by Thatcherism and the ascendancy of the New Right. Rather than regime I prefer the notion of settlement. The point being that settlements are not only negotiated but have to be constantly re-secured. They are therefore always vulnerable and in danger of unravelling. Notably, in relation to Thatcherism, the New Right and neo-liberalism, this settlement has never been fully secured and is on-goingly contested (Johnson, 1998), though there has been an attempt to render it hegemonic and embed it in common sense.

Neo-liberal concerns have impacted upon Germany and continental Europe in relation to competitiveness, the market, and austerity. IFRC notes the salience of mini jobs, low waged work in Germany, with Streeck commenting on the significance of cuts in welfare and the decline of the middle class, which articulates with the consolidation state. Streeck (2014) has discussed the shift from a tax state to that of a debt or consolidation state in which the aim is to service debt whilst maintaining competitiveness.

Consolidation as a confidence-building measure proceeds, almost as a matter of course, *not by raising revenue but by cutting expenditure...* ***A budget surplus is preferably used to pay off debt or cut taxes, to suppress political temptations to restore previous spending cuts*** (my emphasis) (Streeck, 2016, p. 122-3).

It is important to acknowledge that capital is not all of a piece and that the above processes will be played out differentially in relation to the specificity of the particular social formation and labour market. Jessop (2015) for example draws our attention to the differences present within neoliberal capitalism – his variegated neoliberalism – referring to the distinction between the finance dominated versions found in the US/UK as against German neo-mercantilism.

One of the successes of neo-liberalism has been to break down national borders whilst simultaneously emphasising the importance of regionalism and localism. On a simplistic

level this can be seen in England in the division between north and south, with the former having higher rates of disadvantage in terms of unemployment and restricted labour markets. Paradoxically, and despite the rhetoric, such regional disparities are also found in continental Europe, East and West Germany being a case in point.

Social geographers (Martin & Morrison, 2003) draw our attention to the spatial and constructed nature of labour markets as well as their porosity. Alongside a local labour market that features low waged intermittent work, or indeed no work at all of the type that Shildrick et al. (2012) discuss in the north of England, there may be other workers lodged within a global labour market of high skilled/waged work. Such global and local labour markets may in some senses overlap but will also be on-goingly constructed and subject to change (Martin & Morrison, 2003). This means that within a social formation, areas of full employment and putative skills gaps/mismatch sit alongside regions/localities characterised by multiple disadvantage and the lack of decent jobs (Keep & James, 2012; Orr, 2016).

3 Digitalisation, Jobless Growth and Unhelpfully Reforms

It has been argued that globalisation in the 1970s was linked to de-industrialisation which led to low waged manufacturing processes being relocated in the emerging economies. This impacted most heavily upon US and UK's manufacturing sectors. It is also allied to changes in technology and the accompanying changes to labour processes. This can be seen both in the spectre of 'jobless growth' as well as the way in which the internet can effectively lead to a 24 hour labour process that follows time zones and reflects the compression of time and space.

This has consequences for the global labour market with respect to particular skills and can be seen in the manner in which design processes can be distributed across the globe resulting in a high skill/low wage nexus (Brown, Lauder, & Ashton, 2011). In addition, Brown et al. (2011) draw our attention to digital Taylorism, that is to say the use of digital technologies to deskill and standardise formerly skilled jobs of knowledge workers. This has particularly impacted upon white collar and professional occupations (Susskind & Susskind, 2015; and see Autor & Dorn, 2013). This represents, in part, the hollowing out of middle level jobs but also moves in the direction of 'technological unemployment' with digitised jobs leading to a loss of employment (Peters, 2016).

In some of the arguments that stress technological unemployment there is an element of determinism whereby digitalisation and the increasing use of algorithms carries with it the inevitability of job losses. Frey and Osborne write, citing a technical report produced by McKinsey Global Institute (MGI),

Estimates by MGI (2013) suggests that sophisticated algorithms could substitute for approximately 140 million full-time knowledge workers worldwide... The trend is clear: computers increasingly challenge human labour in a wide range of cognitive tasks (2013, p. 19).

Not dissimilar arguments are a feature of recent research addressing robotisation (Ford, 2016), the fourth industrial revolution, or what some term the second industrial age

(Brynjolfsson & McAfee, 2011; 2014) together with those that discuss ‘job polarisation’ (Heyman, 2016). There are several points to be made. Firstly, Pfeiffer (2017) argues that much of this debate is overstated and fails to have a sufficient empirical base or engagement with manufacturing labour in highly automated and digitalised work environments. She emphasises the needs for skilled labour in such contexts, a not dissimilar argument is made by Saniter and Howe (2017). At the same time, such processes have an impact on the graduate labour market. Commenting on over-education/qualification in the UK, Green, Felstead, Gallie, & Henseke (2016, p. 128) suggest,

The number of graduates in the labour force has begun, especially in recent years, to outpace the number of graduate jobs. This is why, increasingly, some graduates are finding themselves in lower-ranking jobs. . . by the middle of the 2000s it became evident that there was an increasing dispersion in the graduate pay premium.

The dispersion of this pay premium is related to the subject studied, the university attended, the individual’s race and gender as well as their class origin (DBIS, 2016; Reay, David, & Ball, 2005).

Unsurprisingly, labour market analyses are predicated upon waged labour and therefore underestimate the significance of unwaged work. For example, user activity on the Internet can be construed as a source of ‘free’ unwaged labour as it may contribute towards the profits of capital, as can the development of open source software (see Avis & Reynolds, 2017; Frayssé, 2015). Standing (2014) also reminds us of the unwaged work of the unemployed searching for paid labour.

In addition, it is important to acknowledge forms of labour that are unwaged but which are in many senses ‘productive’ in as much as they produce value for participants and contribute to wellbeing. The domestic labour of women would be a case in point as would other activities in the wider community – volunteering, visiting neighbours, caring for the environment and so on. The important point is that there is an infinite potential for ‘productive’ labour - what could be described as ‘really useful labour’ in a capitalist and post-capitalist society.

Rustin (2013) for example, calls for a different economic and institutional architecture that would prioritise the cultivation of human needs and capacities and necessitates the re-evaluation of the way in which we understand economic relations and growth. This argument faces in several directions at once. It could align itself with Marxist conceptualisations of ‘species being’ and ‘unalienated’ labour. Alternatively, it could sit alongside an inclusive capitalism predicated on a model of ‘workfare’ with all the difficulties this portends. The danger is that leftist strategies can easily fold over into a form of capitalist reformism rather than one committed to revolutionary reformism predicated on an anti-capitalist stance.

To engage in ‘really useful labour’ necessitate the financial resources that would facilitate access to these opportunities. The difficulty is that most lack the resources, or where they do exist, these are in the form of workfare. To address this issue requires a fundamental rethinking of the nature of waged work, demands the provision of a univer-

sal basic income (Standing, 2014), and a revolutionary desire to struggle towards for a post-capitalist society.

Although it is correct to argue that over-qualification and underemployment are features of many western labour markets, it is incorrect to imply that there are insufficient opportunities, the need for graduate level labour, or indeed any type of ‘productive’ work. In this instance ‘productive’ work is synonymous with ‘really useful labour’. This type of analysis demands that we address the distinction between waged work/labour and unwaged work/labour and their validation. With respect to waged labour, whilst many on the left condemn exploitative and oppressive labour, they nevertheless come near to celebrating such work in its absence (Avis, 2014).

Exclusion from waged labour is seen to carry a raft of negative social consequences deemed harmful for both the individual and society (see for example, Wilkinson & Pickett, 2010). A rather different emphasis that draws on ‘really useful labour’ resonates with Marx’s imaginary of ‘unalienated’ labour. For Marx labour is central to our ‘species being’. Italian workerism, cognitive capitalism and antiwork (Weeks, 2011) offer a rather different view of waged labour. These analyses question the productivist and economic assumptions that underpin much of the debate and are particularly salient in the current conjuncture facing western economies. Blacker suggests,

The current neoliberal mutation of capitalism has evolved beyond the days when the wholesale exploitation of labor under-wrote the world system’s expansion. While “normal” business profits plummet and theft-by-finance-rises, capitalism now shifts into a mode of elimination that targets most of us – along with our environment – as waste products awaiting managed disposal (Blacker, 2013, p. 1) (and see Marsh, 2011).

Those neo-liberal processes that have hollowed out middle level occupational positions and exacerbated the development of a polarised labour market and income distribution have created a socio-economic context in which the winner-takes-all, referred to by Piketty as ‘meritocratic extremism’ (2014, p. 416).

Such a context questions the myth of meritocracy. Many of those who are located at the margins of the class structure, will materially experience the collapse of the opportunity structure (Brown, 2013). The result is that aspirations for mobility will be stalled, or the aim may be to avoid downward mobility in what is experienced as an increasingly precarious and insecure situation. Roberts (2016) has drawn our attention to similar conditions facing East German youth and suggests this anticipates all our futures in the west rather than being a glitch in the modernisation of the former GDR.

There is a reformism here that calls for a politics of access and a fairer distribution of life chances set within a flatter distribution of income and wealth. This can easily fold over into a social democratic concern with equal opportunities, a stance that stops short of a revolutionary and anti-capitalist project. This is what Lingard, Sellar and Savage (2014) refer to as an equity model of social mobility, predicated upon individualism and the development of human capital which reduces social mobility to a technical issue. At best such a version has an affinity with a social democracy that seeks to soften

structural inequality without posing a significant challenge to patterns of inequality that are grounded in capitalist relations. Notably, the struggle between labour and capital may result in an apparently more egalitarian social formation as it did following the end of the Second World War when the balance of power between labour and capital shifted in favour of the former. However, such gains have been reversed, or at least stalled in the current conjuncture in an increasingly polarised social formation in which the antagonistic relations between labour and capital have shifted in favour of the latter. Whilst such processes are most acutely felt in Anglophone societies, they are also present to a lesser extent in continental Europe.

As against an equity model of social mobility an equality model is predicated on a much broader, philosophically and politically informed understanding that goes beyond technicism and individualism and offers a challenge not only to neo-liberalism but presage post-capitalism. A hollowed out and polarised class structure offers limited upward mobility. An equity model can only serve to justify and entrench inequality under the illusion of meritocracy.

Byrne (2017) in a critique of Wilkinson and Pickett's *The Spirit Level*, (2010) sets this within a Fabian and technicised discussion of inequality that seeks to minimise the inequities of capitalism but nevertheless leaves these relations in place. In this sense social democracy represents an ideology that celebrates a move towards a more egalitarian social structure whilst simultaneously attempting to secure the interests of capital.

The limits of this reformist politics set in the current context in which class structure is being hollowed out, could prefigure a rather different class politics. Byrne (2017) in a paper which references the past as well as the present seeks to resuscitate the notion of the aristocracy of labour.

He uses this term to refer to those in the top half but outside the 'top decile and certainly the top 1 per cent' (111) of the income distribution. This group depends on its income from waged labour but has experienced a decline in real wages, facing growing insecurity and whose children face an uncertain future. Brown (2016) in a rather different vein refers to 'a crisis in middle class reproduction that has yet to find expression in class opposition' (p. 205).

Byrne's analysis suggests a common cause across the gradients of class structure amongst those who have to sell their labour in order to survive. Perhaps the specificity of the current socio-economic context prefigures this possibility. The alternative is a politics that continually shuffles class positions in a hierarchy, for as Brown reminds us 'positional conflict and inequalities in power are defining features of the competition for livelihood within capitalist societies' (2016, p. 202).

Such a stance poses questions about the way in which we conceive capitalism and the possibilities for its reform/transformation. The issue is whether we conceive neo-liberalism as a distinctive form or merely an expression of the logic of the system that is driven by the pursuit of capital accumulation.

In the latter case the particular variety of capitalism is the outcome of the struggle between capital and labour and the subsequent balance of power. This means that in those forms akin to social democracy there is a constant struggle by capital to reassert its

power, and under neo-liberalism by labour to constrain the power of capital. This toing and froing fails to resolve such tendencies and can only be addressed in a post-capitalist society forged through struggle.

4 Towards a Conclusion

In this paper I have explored the relationship between VET, the labour market and social justice, by placing the discussion in the wider socio-economic and political context and the changing nature of waged labour. This sits alongside not only the intensification of labour but also the expulsion and marginalisation of particular groups of workers from employment – the notion of surplus labour. This is particularly salient in relation to questions of social justice, leading to restricted opportunities for social mobility and thus the entrenchment of inequality. Importantly, such processes need to be placed in their spatial and global context within particular social formations - if you like the pattern of social relations. So for example one cannot make sense of Germany's position without considering local, regional, national and global relations, acknowledging these are framed by neo-liberalism. I guess the key question is whether capitalism is all of a piece, or whether some form of reinvigorated egalitarian capitalism promises social justice. A possibility which I doubt.

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Theme Centered Interaction in Critical Vocational Teacher Education: An Introduction Into an Ethical Founded Method and Model to Strengthen Self-reflexive Autonomy and Socially Responsible Action

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Abstract

Context: The train of thoughts in this contribution is situated in the VET teacher training on an academic level, as it is usual in Germany. Key issue is the pedagogical qualification of the VET teachers and the question of how to give them possibilities to reflect their own biography, their interdependences to the actual cultural and economic environment and their way to choose the pathway to become a VET teacher. How to enable them to argue with their values, fears, strength and weaknesses in their life and especially in leading groups, as they will have to do in classroom management. And at least how to give them an idea of an emancipative, critical and participative way of forming learning situations in which they feel sure and lively to encourage the apprentices and learners in schools to act autonomic and critical in work and besides. This is necessary because of the changes in work and VET in the recent centuries with consequences for workers, learners and curricula as well as the contradictions in that process.

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Approach: The transformation and the liberalisation of markets and changes of work organisation, the enlargement of tasks in the occupations adds greater meaning to social knowledge and competences, the ability for teamwork and personal development in vocational education. To develop this ability Theme-Centered Interaction (TCI), as a humanistic-psychological approach is used and combined with Critical-Subject-Oriented Vocational Education Theory, inspired by the Critical Theory of the Frankfurt School. VET-teacher students learn in theory and practice to shape their own way to lead themselves and the pupils in the class and to reflect their activities in a critical way of thinking. The paper ends with brief description of seminar lectures with VET teacher students at the University of Rostock where TCI is practiced as one example how we can reach the objectives described before.

Findings: The TCI-concept is helpful to set up better teamwork and self-reflection in the group of the learners. Its a useful way to prepare them for their practical school phase in which TCI is used as reflection model as well.

Key Message: Universities as learning places in the tradition of enlightenment have to open up spaces in VET teacher development for domination-free communication and participatory learning within the framework of university studies, which can create a distance to a given social reality, enables students to dissociate from collectively developed goals to become critical formers of their working life and teaching.

Keywords: VET, Vocational Education and Training, Vocational Teacher Students, Communication Skill, Critical Thinking Skill, Interpersonal Competence, Curriculum Development

1 From “We do what we’re Told” to the “Human Centred Factory”

In the tradition of medieval crafts it was common that the journeyman usually followed the rules of the handcraft masters. They were not allowed to invent new ways of producing or new products. It was a question of protecting the market, preventing rivalry and at least stabilize the domination of the masters to hinder innovation and autonomous decisions of the journeymen (Stratmann, 1993). In midth of the 19th century the journeyman start to realize the different interests of them and the masters and started to organize their own associations.

Karl Marx analysed during that period the situation of the workers in the industry and pointed out that they are losing the essential meaning of human work because of disaffection (Marx, 1962). Because of the process of increasing of division of labour and the automatization the workers lose more and more the freedom to make their own decisions in work and started to be an appendix of the machines in following the orders of the capitalists. But it get more and more normal that the owner of the company is allowed to fix the rules of work, and that losing the right to act as a free human during working time and following in blind obedient the order of the owner of production resources. Getting the strength back to the workers the unions tried to protect the

workers more and more from inhuman work environments. In most cases it ends with collective bargaining including some agreements on health protection and holidays. In the early 1970s the German Unions began to call for humanisation of work and started some projects and research on that topic (Vetter, 1973) In that time German Unions described the aims of humanisation as follows: “What is new, however, is that the diverse aspects of the conditions of work , which have hitherto been dealt with more or less piecemeal, are now seen as part of a large whole embracing related matters such as the organisation of work (i.e. of the production process itself), hierarchical structures, relation with workmates, the social situation within the firm, the working environment, participation in decision-making at all levels, and opportunities for self-development and advancement” (Engelen-Kefer, 1976, p. 227). But this became very rarely reality and in only a very few companies workers were involved in decision making on all level or reached participation in profit (Schapfel-Kaiser, 2005). But Engelen-Kefer described what humanisation really could mean.

It was in 1995 when Petersen and Rauner published a paper, titled: “Education and training for the human centred factory” that was inspired by the famous MIT study about lean production. The hope was, that the projects in the late 1970th who dealt with humanization against routine work and towards job enlargement would be continued and supported by the new production strategies and changes in work organisation. The “modern work environment” with team production, decentralised quality assurance and co-consideration would help to enlarge qualifications, open space for shaping technic and work. But, as we know now, this happens only in a few cases. In most of the companies with lower co-determination by trade unions and works councils, it leads to more time pressure for the workers, flexibility that only takes the need of the organisation in count without real benefit, rather they “earn” more health damage from a psychological point of view (Schröder, 2009; Kaiser, 2008).

Nevertheless, it should also be noted that the qualifications in the training regulations have changed and have certainly taken up the changes in working life to the greater importance of social competence as a key competence (Streumer & Bjorkquist, 1998). This happens in Germany long before the debate has started about the implementation of EQF and National Qualification frameworks with their three / four descriptors: Knowledge, skills and competence (Europaen Commission, 2008)¹. This change is also of special significance for the qualification of in-company and school-based training employees. Their workconcept changes; from leaders to learning guides. “As already described, the trend from teaching to learning creates a need to change the practices of VET teachers who have traditionally worked alone and concentrated on disseminating knowledge to trainees. Today, teachers need to work in teams, they have to be able to guide trainees more than just transfer knowledge, and they must also be able to plan, describe and reflect on their own teaching practices (Cort, Härkönen, & Volmari, 2004, p. 20). Theme-centered interaction (TCI) as a systematic qualification method for trainers in companies can then also be found sporadically in recent times (WILL-Schweiz, 2004).

¹“... in the German-speaking countries, the common differentiation is between Fachkompetenz, Methodenkompetenz, Personalkompetenz and Sozialkompetenz; while in the English-speaking countries, the conventional categorisation is between ‘cognitive competence’, ‘functional competence’ and ‘social competence’.” (European Commission 2008, p. 5)

2 Bildung in the Tradition of the Critical Theory of Frankfurt School as an Indivisibility Part of Vocational Education

Vocational training is responsible for the transition of young people from the education system to the economic system. In an economic system that follows the primacy of maximisation of profits, vocational training focuses on the usefulness of the qualified worker. Governments and the commission of the EU are measuring the success of a VET system by the successful transition from school to the labour market. In contrast, the claim to Bildung, in the sense of human self-empowerment and the ability to participate comprehensively in shaping social and individual relationships, takes a back seat in measuring the success of a VET system as part of national education systems.

There always had been a tension between vocational and general education. The contradiction between integrating Bildung, in the spirit of enlightenment into the existing system and at the same time empowering people to lead their own lives in a fair life has been made already clear in the early bourgeois concept of Bildung (Koneffke, 1987) and in vocational training (Kaiser, 2016). This contradiction of Bildung that is oriented on an economic system that works on categories as “faster”, “bigger” and “more” to appreciation of balance and thoroughness was a part of Max Horkheimers (a philosopher of critical theory from Frankfurt school) ideas in the 1950th inspired by the crucial experience of the Nazi era. “The process of Bildung has turned into that of processing. The processing—and this is the essence of the difference—leaves the object no time. But time stands for love; to the thing to which I give time, I also give love; violence is quick” (Horkheimer, 1952, p. 166).

The preparation of individuals for assuming a specialised social function through qualification; the purpose-oriented acquisition of skills, abilities and knowledge, as it is called in the jargon of the Vocational Training Act in Germany, appears to be a necessary prerequisite for efficient work processes in the complex organisation of our increasingly networked societies. The question of the breadth, depth and orientation of this preparation is that of Bildung par excellence and thus also a central question of vocational training.

When Horkheimer, in 1952 and 1953, addressed to students, compares the process of Bildung with that of processing and speaks of the development of technical skills and the accumulation of objectified information, he does not refer to vocational education but to the study that was in store for those present at the time. The emphatic appeal of taking time to get to the heart of things and to find out what is at the heart of them is as true then as it is now, but may perhaps seem almost ignorant of the realities of the Bologna reform era. He is an impertinence in the best sense of encouragement.

Does this older quote perhaps show that, in the present circumstances, academic and general education is closer to vocational training than it claims of itself? Conversely, has vocational training possibly moved a long way from the bondage education as which it identifies Heydorn and many other general educators?

“The formation of the concept, the formation of consciousness in the strict sense, falls to the rulers, so that the possibility of disposal over the empirically given, the

freer movement in time and space; the formation of the servant remains bound to the materials, it is labour (Heydorn, 1973, p. 270).

Heydorn distinguishes the formation of servant and master by the possibility to detach oneself from the directly given object by means of *Bildung*, to think about it and to shape the conditions in one's own sense. On the other hand, the servant follows unthinkingly the demands for work, in the sense of manual labor. However, the further development of work in times of digitalisation and modern vocational education and training, combined with the reduction in the number of occupations, the increasing systematisation of knowledge stocks and the associated broadening of the knowledge and skills to be acquired in initial and continuing training, has now led to a significant expansion, which speaks at least partially against the "slavery" approach of education to a compliant workforce. Whether it is as close to what Heydorn addressed with awareness raising and whose lack he already complained about in the general education system remains just as doubtful as the question whether it is the subject of general education today.

The indivisibility of *Bildung* demanded in the 1970s and especially in the tradition of critical education theory is a demand for vocational and general education equally; it is formulated only rarely in vocational pedagogy. Connected with it is the possibility for everyone to develop critical self-confidence (Paffrath, 1992) and the ability to relate individually to things and to oneself and to develop utopias that go beyond the present.

"From the forces of intellectual and ethical resistance, the utopian capacity drains as an indigenous, but always first to be released. According to Heydorn, this personal interpersonal encouragement is needed so that the idea of freedom can be experienced sensually in the ideal of free struggle and calls for a continuation in solidarity. When it happens, the utopian ability is at the same time instigated to begin its obliging visualization" (Gamm, 1983, p. 173).

Due to its indivisibility in all fields of pedagogical work, the task of *Bildung* and in consequence vocational education, is to incite people to think beyond the present, to think together out of the reflection of human history and to practically develop it further with the help of utopian images.

This should have consequences for the VET teacher education in the study programmes at universities. They have to enable students to develop their own vision of how is the shape of a good vocational education. That means to encourage the teacher students to reflect the social processes, the phenomena of inequality in the selection processes of schools and private apprenticeship contracts as well as the contradictions of vocational education embedded in a capitalistic economy. "Enriched in historical reality, *Bildung* remains an achievement of abstraction; only society, brought to its full abstraction, enables it to recognize the richness behind bars, the fullness into which human can enter" (Heydorn, 1970, p. 27). So, the analyse of the historical shaping of the national VET-system as a bridge between educational system and labour market has to be enlightened to get in touch with role of the different interests of union, employers and government and the changes that happened because of political, cultural and technological changes in the society.

At the same time, we should be aware, that learning is minimum as strong influenced by the learning form as by the curricula of learning. That means, if we want to de-

velop the teacher students skills to shape the changes of vocational education, and they should be able to do so as professionalized agents in that system, we have to develop their skills to create a democratic, participative form of learning situations. Based on that considerations, we implemented at the University of Rostock besides courses on theoretical reflexions of different paradigms of pedagogics, training their argumentation and theoretical reflexion skills, specific vocational training methods as work based learning, project learning and guided experiences in the schools and other learning places of VET a seminar on Theme-Centered Interaction (TCI) with two main aims:

1. Critical reflection on the own biography, experiences of teaching and learning to get a critical point of view on the own behaviour and mentality. To get more emancipative from the unconscious influence factors.
2. Getting in touch with an utopian idea and practice of participative, creative way of teaching and learning that encourages the learners to take a more important part in the development of the learning process, to allow them to take time in self-reflexion and to get an experience of the power of a learning group when a culture of authentic participation and team oriented work has been developed.

The following part of the contribution shows why TCI has been chosen, where the parallel roots to critical theory are and why it helps to strength skills for vocational education in a democratic society.

3 “To Know that Everybody Counts – Against the Social Coldness” – History and Concept of TCI in a Nutshell

3.1 TCI as a Descendant of Psychoanalysis and Reaction on the Nazi Regime

TCI is both a research method, a pedagogical method and a psychological theory (Schapfel-Kaiser 1997). It has its roots in the psychoanalysis in which its founder Ruth Cohn was trained. From her involvement with humanistic psychology she developed the form of therapy into a pedagogical approach which, as the practice progresses, wants to enable the participants to become more and more aware of their inner resistance on the one hand and to take responsibility for their own actions with regard to themselves and the rest on the other. Cohn expressed this idea in a little poem I picked up on in the title of chapter 3:

*“Knowing we count
with our life
with our beloved
against the cold*

For me, for you, for our world” (Cohn, 1990, p. 2).

In doing so, she takes Harry Sullivan's further development of Freud's approach to an interpersonal relationship theory and leaves the therapist's distanced attitude, transforming the therapist of a group into the role of the participating group leadership. "The experiences gathered in psychoanalytic groups, namely, that it is possible to create an atmosphere of trust by demanding authenticity and an open and responsible exchange of feelings, led Ruth Cohn to conclude that these phenomena should be introduced and pursued as well in nontherapeutic groups. TCI, with its principles of group education, is the attempt to create just these conditions that enable trustful cooperation" (Rubner, 2017, p. 32). But the emergence of the TCI and the significance of values associated with it points to other sources ranging from French existentialism and American pragmatism to Ruth Cohn's own life story. A quote from Satre can underline the link to existentialistic philosophy: "And if we say that human beings are responsible for themselves, then we are not intimating that humans are responsible only for their own individuality, but rather that they are responsible for all other human beings" (Sartre, 1961, p. 12, quoted from Zitterbarth, 2017, p. 46).

It was during the Nazi era, when Ruth C. Cohn, a Jewish woman, born 1912 in Berlin flew first to Switzerland, where she started studying psychoanalysis and moved some years later in the USA to complete her therapeutic education. She lost nearly her whole family in the Nazi concentration camps. In contact with some therapists in the tradition of humanistic psychology as Carl Rogers, Virginia Satyr and Fritz Pearls and influenced by the intellectuals in Europe and their discourse about the theory of Karl Marx and the existentialism from Jean Paul Satre and her own experiences she developed her own theory. "TCI is very much influenced by psychoanalysis and also very much influenced by the historical situation of national socialism" (Cohn, 1992, p. 317).

The emancipation from the dogmatic psychoanalytic schools since the 1950s came from the perception that the couch is too small to meet the many problems of mankind and to open up as a therapist for people who would not seek therapy. The finding that we live in a sick society, as shared by Erich Fromm and other social scientists associated with critical theory and psychoanalysis, shows TCI's connection to the critical theory of the Frankfurt School. And so it is that many of us, for part of the working day, leave our little couch-centered offices and chair-circled rooms to meet with people anywhere outside in the school's faculty room, at conference tables, in classrooms, in social or political meeting places, at the bank president's luncheon table, in the workman's cafeteria, or wherever groups of people work or live together or wish to develop their capacities in similar directions. We have come to realize that frustrations and hatred need not destroy, but can be lived with, integrated and used. We have learned to assist in opening doors to constructive and creative living. We take our tool kits with us on the road. We hope to win the race against unnecessary decay and global death by social action" (Cohn, 1969, p. 2). During the following years TCI was developed as a group-pedagogical method and theory, first used in workshops of psychotherapists and later used in many contexts, as Cohn described in the quote. When Ruth Cohn moved back to Europe, Germany and Switzerland in the 1974 TCI spread in the German-speaking world. The training institute WILL (Workshop Institute for Living Learning) was founded and many people were trained to practice TCI in schools, apprenticeship, training leadership, pastoral

care and psychotherapy and supervision. The subsequent remarks will give a short inside in the basic model. The actual translated Handbook of TCI provides deeper insides (Schneider-Landloff et al., 2017).

3.2 The Model of TCI

The TCI's four-factor model is the central model for designing and analysing events in groups, regardless of whether they are being taught or meeting.

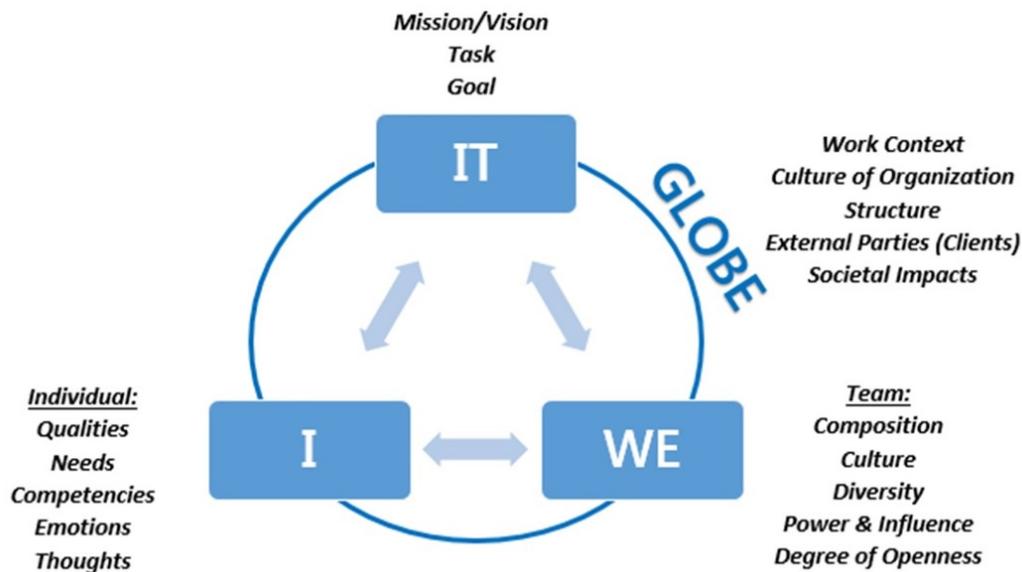


Figure 1: The Triangle in the Circle

In most professional contexts, encounters and forms of learning take place that leave no room for encounters with the subconscious. The reflection and visualization of the urges and needs that exist in the respective individual and between the members of the working group are pushed into the realm of taboos. The part covered (tabooed) by water of the iceberg, described by Freud thus, has an effect and threatens to stand in the way of humane and authentic cooperation.

Therefore the reflection on one's own (**I**) self stands at the beginning of a meeting of group members. Although it is always taken into consideration that the individual's becoming is subject to social and historical restrictions (it comes from external conditions, some of which have become difficult to change), the challenge: "Be yourself" remains a central starting point and goal. "Only I and no one else can experience and represent my perceptions, ideas, feelings and thoughts for me, no one but me has my memories and desires and decides for me" (Matzdorf & Cohn, 1992, p. 71). The independent creation of my own image about experiencing and becoming aware of images of myself and others is encouraged by "...the way to the ancestors and the way to the others around me" (Langmaack, 1991, p. 41).

From an anthropological point of view, man proves to be deeply related to others and referred to them. The group (**We**) that we open the self-centered person for the world and the world for him. "At the border, encounter is possible. We develop our self-existence in the other person. On you, man becomes I, as Martin Buber says" (Amann, 1993, p. 158). The integration of the individual in the formation of a group requires respectful treatment, which does not require submission but an effort for authentic participation in one another. "It is a love- and relationship-capable ego that constitutes the vision of theme-centered interaction, and not an ego that revolves only around itself and is dominated by the desire for self-awareness and self-development (Kroeger, 1993, p. 103). In order to enable the subjects involved to develop into the I, the group members must experience and respect themselves as complement and background, as independent subjects, whose blind classification in the group always results in a loss for the same, while the preservation of difference contributes to the strength of the group. "In my search for such elements I noticed that the liveliness of group therapeutic learning has to do above all with a respectful attitude towards the emotional world and the personal state of the individual. The group is personally involved when one of the participants speaks of himself; it takes his violent palpitations, his heavy breathing, his tears and his joys as important. Emotions are respected as man's very own right - regardless of whether they are realistic or represent an illusion" (Cohn & Farau, 1984, p. 112).

The topics (**It**) serve orientation in a concrete situation. They are the central reference and challenge arising from the objectifiable phenomena and their demands on the group. Topics arise from the common interests of the participants (saving energy in private households; designing theoretical lessons at vocational school, getting out of individual traffic...), the tasks required from institutional contexts (joint planning of the distribution of tasks of an institute, a working group...) or from individual conflict situations of the participants, which may lie outside the context, or may relate to other group members, which concern common structural finding or similar. The topics thus serve to define a manageable common task and to open up the context to the outside world. "When the subject, the task, is wanted and supported by all the ego as a concern of its own and in relation to one another, there is an optimal work situation (Matzdorf & Cohn, 1993, p. 72). The process of the group itself can become an issue, because resistance to other issues can only be overcome by clarifying the emotional aspects within the group.

The **Globe** stands for the environment, the external influences to which the group is exposed, it sets the limits and is at the same time the real place in which the group members act. Only a realistic knowledge of the Globe will qualify individual perspectives. It is the link between subjective experiences and objective circumstances - is at the same time the starting point and goal of the TCI conditioned by the recognition of the individual interdependence of the individual subjects in the global context of life. "In dealing with the Globe, the TZI shows its relevance to everyday life. What is a matter of course in individual therapy also applies here: Bringing the participants out of their Globe into the group events or into another project and leading them to the end" (Langmaack, 1991, p. 74). The weighting of the influences of the Globe are certainly different at each meeting of the group, depend on the general events of the day, and those that affect the individual participants depend on the different interests and perspectives

of the participants, their life contexts. Taking these influences into account, or taking them up facilitates the understanding of the leaders for the situation of the group, and sensitizes the group to itself and its environment.

Between the four elements of the structural model of theme-centered interaction there is a dynamic in the process, which leads to an over- and underemphasis of the individual elements. This means, for example, that massive personal disturbances can lead to neglect of the topic, as well as lustful group-dynamic exercises and experiences contribute to the lack of consideration of the Globe. The goal of designing educational processes with the help of the TCI and thus an essential task of the managers is to maintain balance. However, this cannot be done by the leaders alone. All participants are encouraged to lead themselves and to give priority to disturbances.

4 The Implementation of TCI in the Study Programme of VET Teachers

4.1 The Structure and Objectives of the VET Teacher Study Program at the Rostock's Institute for Vocational Education

The study for the teaching profession at vocational schools takes place as a six-year Bachelor-Master study standardized by federal rules in Germany and is divided into three essential subjects: the professional subject (agriculture, metal technology, information technology etc.), a second general educational subject (German, mathematics, English etc.) and studies in vocational education and educational science, to which the TCI seminar belongs. Most students at the University of Rostock in the study programme for vocational teachers already have vocational training in the dual system or, if their professional experience lies in health or social work, have full-time school-based vocational training and work experience in addition.

The lecturers at the Institute for Vocational Education at the University of Rostock share the concept of critical vocational education and have increasingly oriented the individual modules and courses systematically towards the common goal of encouraging and empowering students to critically shape vocational education in the context of the development of their studies. This is based on the tradition of critical theory as described in chapter 2 in this article. Of particular importance here was a two-day retreat in March 2017, at which this mission statement and the competencies associated with it were systematized and assigned to individual modules in a second step in key areas (an approach based on professional and curriculum development within the framework of reorganization procedures, as developed and implemented by the author and others at the Federal Institute for Vocational Education and Training).

After an individual brainstorming session, goals of vocational school teacher training in Rostock were first compiled and then clustered with regard to the main categories of knowledge, ability and attitude. This gave rise to the vision of the characteristics of ideal graduates in the degree programme and the abilities, skills, attitudes and knowledge associated with them. Examples of this are:

Skills and abilities: You can...

- organise participative teaching and conduct research into teaching
- support young people individually in their development process
- plan, implement and reflect on projects
- take care of yourself and shape your own competence development
- develop cooperation and moderating discussion situations
- argument your own thoughts

Knowledge: You have knowledge of...

- Vocational training facts and where to find them
- Paradigms of vocational Bildung
- Theories of vocational education and educational science
- Systemic contexts and their emergence
- Analysis of own experiences and self-reflection

Attitudes: You have willingness to practice...

- Tolerance and solidarity
- Transparency
- Authenticity and closeness
- Assumption of responsibility
- courageous action
- Curiosity and openness (inquiring attitude)

The module “Introduction to Vocational Education” consists of a lecture that provides an insight into the structures of vocational education and the scientific discipline of vocational education, its historical development, central concepts and specific topics such as youth, law, didactics and socialisation. Social exclusion is being addressed and other forms of vocational training are already being made visible in other countries. This lecture is accompanied by a seminar on the history of vocational education and training in which the specific situation of each historical epoch is worked out by the students on the basis of source texts in addition to a short lecture impulse. This makes it clear that

the vocational training system is involved in a social development in the area of tension between the educational and economic systems, over which the respective form of social rule exerts a massive influence, as the significance of craftsmanship in the Middle Ages and the comparison of structures in National Socialism and in the GDR make clear. At the same time, the students gain initial experience in working with sources, recognize the different representations and interests in an epoch, depending on the background of the respective authorship, and practice their own arguments. History and vocational training are thus experienced as shape able, which do not develop naturally, but are influenced by people.

In the following academic year, terms in particular will be deepened and system structures will be analysed in greater depth. By writing an independent essay on key basic concepts of vocational education and training, independent opinion-forming and its argumentative presentation will be further developed. At the same time, the module on methodology and didactics introduces different forms of subject-oriented teaching and learning, is coupled with a company excursion and introduces the basics of the learning field approach, which prepares for the first orientation internship with a school and extracurricular part. Embedded in this module, an intensive examination of one's own individual development and the possibility of creating lively participative classroom design takes place.

4.2 “Leading Yourself and Groups”– Concept and Practice of the TCI Seminar

The theme centered Interaction seminar open space for intensive biographical self-reflection with regard to one's own social contexts, conscious and unconscious role models and experiences of leadership. Different creative methods of bodywork, sculptural design and painting of pictures as well as lively interaction between the participants are used. This includes an introduction to the theoretical principles and interrelationships of the TCI as well as to the rules and models of the method. At the same time, the students try out their first topic-centred leadership situations on topics which they select themselves and which have to do with their immediate life situation. They receive mutual feedback on these. The topic-centered interaction (Langmaack, 2004) serves as methodical and ethical.

The seminar begins with an introduction to the method and an orientation of the participants to the form of encounter in the seminar in the form of a circle of chairs, which makes it much easier to meet openly and to perceive all participants at the same time. This is followed by the first thematic lecture, which makes it clear that the individual is the starting point and goal of every pedagogical process. Here, the first self-reflection of individuals takes place, who realize their relationships to other people and groups and reflect on the question: “What is important to me in my current and future educational work!”

Following this individual reflection, which is accompanied by a pictorial representation, the participants hold a two-way discussion and then introduce themselves to each other in the group's plenum.

The two subsequent seminar units are dedicated to the “we” and the “topic”. Here it becomes clear which possibilities are available to the leaders to promote a lively and authentic togetherness in groups and which decisive role the right formulation of topics play. The lessons are overwritten with “We are not a mass - We get to know interactions and forms and rules of encounter in the TCI” and “A successful topic leads and connects”. In the latter topic, participants practice formulating topics based on self-selected content inspired by the selection of objects with which something connects. The intensive contact to the own feeling is supported again and again by body-oriented meditations.

Before a block event takes place in which some of the participants test themselves in their own management on a self-chosen topic, they learn structural and planning aids that help to observe the balance of the triangle in the Globe and also support successful planning in terms of time. The students are individually supported in the preparation and the concept is discussed and further developed with the seminar leader.

An integral part of the block event is a seminar unit with the topic: “We are on the way to good leadership”. This unit begins with the individual conquest of the space in which the seminar takes place in which each individual is invited to assume different positions in the space. Students sit under the tables, step onto the table, walk into a corner of the room or sit on a windowsill. This is followed by a partner exercise in which the couples, connected by long wooden sticks held by gentle pressure between their open hands, guide each other through the room without speaking to each other. The experience of one’s own leadership is now extended to that of mutual guidance and the experience that the more the individual is aware of where he wants to go and at the same time perceives what his counterpart wants. Leadership is experienced as a balancing interplay of give and take. In small groups formed afterwards, the participants exchange ideas about factors of good leadership and are then asked to build a sculpture on the topic of “Good Leadership” based on a collection of objects, which is then presented to the entire group in the form of a museum tour. The unit concludes with a brief exchange in the circle of chairs on commonalities and differences in the sculptures and reflections.

Examples of topics developed by the students themselves are: “My fears and dealing with change”, “Making small things out of big obstacles”, “I am nature, what does nature mean to me”, “Examination anxiety in my studies - how do I face the challenges”, “What is a successful and healthy life for us?”

Since not all students can carry out an independent unit within the framework of the seminar, most develop a seminar concept lasting several days in the form of a paper and reflect on the potential of the TCI at the end of this work.

The feedback on the seminar is very positive and many students say that for the first time they had a situation in which they could reflect on themselves and their future work. They are also surprised at how easy it can be to lead a teaching unit if they build on the potential of the group involved and involve this more in the teaching process. But there were also two participants so far, who after the seminar recognized for themselves that the educational work does not suit them and decided on another further career.

Since we have placed this seminar specifically in the early stage of the study in order to positively support the group process of the respective beginner students, we are also interested in the effect of the seminar on the individuals and the interaction in the group

afterwards. So far, we have observed a significant change in the number of participants with the lecturers and a constructive change in the atmosphere, but will not begin until this semester with a systematic survey of students with regard to the expected effects, based on scales from Rauner's studies on occupational identity (2017, p. 940 ff.) and Deci and Ryan on self-determination theory (1993).

5 Summary and Outlook - The Task of Educational Science Teaching at Universities

The article started with a change in the demands on employees with regard to their social competence without at the same time pointing out the manifoldly increased demands for self-control that accompany the separation of the individual from traditional life contexts, increasing mobility and a variety of conceivable life plans that we can record in the developed nations (Schapfel-Kaiser, 1998). The description of these changes was accompanied by the elaboration of the field of tension between vocational and general education (if general education exists and has ever existed in a purposeless form). To underline this field of tension, the considerations of critical education theory in the tradition of the Frankfurt School were received with central statements and it was made clear that the claim to *Bildung* can be indivisible and can therefore also be brought to bear for vocational education. Teachers at vocational schools in Germany are persons employed by the state who are committed to the idea of *Bildung* and the goal of supporting personal development. To show vocational teacher students the possibility of a democratic and lively learning process TCI was described with its roots and main characteristics of the concept. How this concept is embedded and practical realized at the University of Rostock is the content of the last chapter.

Vocational teachers have to critically reflect on their professional actions against the background of economic and social development as well as their individual biographies and need not only cognitively acquired knowledge but also methodological and didactic competence paired with a personality who courageously goes into contradictions to generalized behaviours. This, coupled with the reflected experience of domination-free communication and participatory learning within the framework of university studies, which can create a distance to a given social reality, enables them from collectively developed goals to become critical formers of their teaching but also of the entire vocational training.

“Insofar as the search for truth creates a spiritually determined community in which, according to Gustav Landauer, 'the generally human and the individual unique' expresses itself, in which it witnesses a connection that does not want the life-fulfilling and future-open possibility to perish in *nitdurft*, numbness, rape and the loss of human dignity, it becomes the commitment of the university teacher to defend the shaping social principle also in it. It is his task to keep open the realization of enlightened reason in the contradictions of the world also as a common possibility” (Heydorn, 1980, p. 74).

In such an understanding, the reflection of human history as well as the seizure of the given possibilities in vocational education and university teaching, paired with the

courage for authentic interaction with the students, becomes one main task of the vocational educational university teacher. Self-reflective awareness and authentic vulnerability at the same time can prevent and encourage technocratic understanding and implementation of vocational education and training. The principle of hope for human coexistence and learning must also be maintained in vocational training.

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The ‘Future of Employment’ on the Shop Floor: Why Production Jobs are Less Susceptible to Computerization than Assumed

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Abstract

Context: Germany is seen as one of the major players in developing what is known as “Industry 4.0”. Especially in the manufacturing and the automotive sector, the vocational training system is seen as a precondition and consequence alike for the global success of these sectors. Current research though characterizes production work, especially machine-related tasks, as dull routine work and therefore of high probability of computerization.

Approach: Based on qualitative research perspectives and sociological results that reveal the importance of experience and implicit capabilities, this study quantifies what is mostly seen as “non-routine” work. To measure these dimensions of living labouring capacity, an index is introduced that is developed from 18 items of one of the biggest German task-based, representative surveys.

Findings: The contribution challenges the widespread prognosis that production workers face high susceptibility. Comparing data on non-routine share in production and of vocational trained workers with those of Frey and Osborne, the findings stress the mostly neglected importance of non-routine work, even in production and especially with vocational trained, machine-related occupations.

Conclusion: The results draw on how much more employees on the shop floor are apt to handle change, complexity, and imponderabilities than often assumed. If their work

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will or will not be susceptible to novel approaches in robotics or algorithms, therefore, is not a question of routine.

Keywords: VET, Vocational Education and Training, Industry 4.0, Routine Task, Living Labouring Capacity, Machine Work, Experience

1 Introduction

With the debate on Industry 4.0, the potential automation of human labor is returning with a new and almost forgotten vehemence. The last few years have seen a widespread discourse of Industry 4.0 (Pfeiffer, 2017), inspiring recent studies to predict future job losses on an unprecedented scale; the most influential one being that by Frey und Osborne (2017) who see 47% of all jobs in the US labor market at risk of computerization. This study¹ predicts that those who work with machines and in the production sector will bear the brunt of these developments. Frey and Osborne estimate that 98% of such jobs may be susceptible to automation.

In the eyes of most labor market statisticians, production and machine-based work is monotonous, repetitive, and physically challenging; the loss of such jobs is therefore on the whole not seen as problematic in itself. This study will critically discuss recent labor market research on the potential for automation through new technology and then challenge its distinction between routine and non-routine through qualitative research, revealing an unexpected relevance of non-routine work especially in highly automated and digitalized work environments (*section two*).

As it is nonetheless difficult to argue against the ever more objective-seeming quantitative data on the basis of qualitatively dense empirical studies, *section three* introduces an index that highlights “living *labouring capacity*” (in German: *Arbeitsvermögen*; Pfeiffer, 2014) rather than routine activity. This novel methodological approach uses the presented qualitative results to construct an index that tries to measure the otherwise unmeasurable phenomena of non-routine (e.g. experience, implicit and embodied knowledge). Utilizing 18 indicators from the 2012 BIBB/BAuA² Employment Survey (Rohrbach-Schmidt & Hall, 2013), the *labor capacity index* (LC Index) unveils the extent to which individuals nowadays are confronted with complexity, unpredictability, and change at the workplace. *Section four* presents some results for machine-related work in production, while *section five* discusses these findings and possible consequences for the design of work environments in the so-called Industry 4.0.

¹Some of the conceptual and empirical work for this research originated in the context of the research project ‘diGAP–Decent Agile Project Work in the digitized World’ (ref. no. 02L15A300); jointly funded by the German Federal Ministry for Education and Research (BMBF) and the European Social Fund (ESF).

²BIBB stands for “Bundesinstitut für Berufsbildung” (Federal Institute for Vocational Education and Training; see <https://www.bibb.de/en/index.php>), BAuA for “Bundesanstalt für Arbeitsschutz und Arbeitsmedizin” (Federal Institute for Occupational Safety and Health; see https://www.baua.de/EN/Home/Home_node.html).

2 The Limits of the Notion of Routine—and Beyond

Frey and Osborne (2017) derive their conclusions on digital technology’s associated effects on the labor market from US labor market data and the views of technical experts. The authors set out from the assumption that there are barely any remaining limits to computerization; those engineering bottlenecks, i.e. tasks that make automation more difficult or delay its implementation, include perception and manipulation tasks, creative intelligence tasks, and social intelligence tasks (cf. Frey/Osborne, 2017, p. 264).³

What particularly interests us here is the question of routine. Frey and Osborne (2017) make certain distinctions on the basis of assessments of the effects of technological change. For example, Autor et al. (2003) introduced a classificatory distinction between non-routine (analytic or interactive) tasks and routine (cognitive or manual) tasks, and indicate two effects of computers: *substitution effects* (routine tasks are automated) and *complementarity effects* (support is provided for non-routine tasks).

Frey and Osborne (2013) take up in their analysis what has become a standard way of thinking about the effects of technical change on labor markets (Alda, 2013; Antoniczyk, Fitzenberger, & Leuschner, 2008, hereafter “AFL”; Spitz-Oener, 2006; 2007, hereafter “SO”). Initially, Autor, Levy, and Murnane (2003), hereafter “ALM,” had—based on US employment data—posed the question of why the increasing use of computers leads to an increase of highly qualified employment. Their study classified work activity into non-routine tasks (analytical or interactive) and routine tasks (cognitive or manual), showing two effects of computer usage: a *substitution effect* (routine work is substituted) and a *complementarity effect* (support of creativity, flexibility, and complex communication, and thus, of non-routine tasks). Ten years later, Frey and Osborne emphasized the significance of technological progress, pointing to automobiles to make their point. ALM had argued that the apparent irreplaceability of a driver shows the limits of automation, but of course, today the driverless car has become a real possibility.

A problem not only for Frey and Osborne but for many others, including for us in our intention to create a new index, lies in the imprecise task descriptions that characterize the US O*NET dataset and the German employment survey.⁴ Some of these classification decisions defy comprehension, most likely because the surveys on which they are

³It is often overlooked that 1) this estimate includes not only risks tied to “digitalization” but also to the “offshoring” of jobs and 2) the authors explicitly refuse to offer a prognosis, speaking rather of potential developments over a long, uncertain period of time of one to two decades. Other authors, too, have recently revisited the historically important argument that had been almost forgotten: technological progress may well lead to the elimination of the need for human labor (Brynjolfson & McAfee, 2014; Collins, 2013; Pistono, 2014; Pupo, 2014). Today, as so often during previous phases of rapid technological change, this argument is either positively associated with the hope that monotonous and physically strenuous work will finally be replaced with creative work (and opportunities for training workers to be more creative), or it is negatively associated with higher unemployment and widespread workforce de-skilling. These two diametrically opposed discourses inevitably pop up together whenever the connections between technology and work are discussed (Zysman & Newman, 2006).

⁴Autor (2013, p. 191) generally criticizes the methodological weaknesses of the O*NET database. It provides more than 400 different scales, and different studies choose to employ different scales without apparent reason. Autor’s assessment of the O*NET dataset is correspondingly reserved: “While I have found that task measures distilled from DOT and O*NET can serve as powerful proxies for occupational tasks, I am at best only moderately comfortable with these tools because their complexity and opacity places little discipline on how they are applied and interpreted.” The IAB/BIBB dataset does attempt to avoid the “pitfalls” of the O*NET.

based are themselves poorly differentiated. It is interesting, for example, that in Frey and Osborne's index, machine setters are considered highly susceptible to automation. Thus, milling and planning machine setters, operators, and tenders, metal and plastic have a 0.98 chance of being replaced by a machine, followed closely by "crushing, grinding, and polishing machine setters, operators, and tenders" with a 0.97 chance. This surprisingly, if not absurdly high probability estimate may result from difficulties caused by combining the tasks of machine setters and machine operators who have very different responsibilities, or from underestimating the importance of substantive differentiation based on the imperatives of production technology. Even a nearly completely self-steering cyber-physical systems (CPS) cannot function without a machine setter, although it might work just fine with fewer operators. The confusion begins with the fact that the work of setters and operators can vary widely, depending on the production technology used, in terms of required skills and experience or of the extent to which the tasks are routine. This kind of problem is confounded by differences in the task descriptions used in different datasets. Thus, the BIBB/BAuA task classifications differ from those used by SO and ALM (Alda, 2013, pp. 24–25) as do the classifications used by AFL and SO. No classification, including the one provided here, can solve the problem that job tasks are too crudely and generally described and thus open up a lot of room for interpretation. For example, one could find virtually limitless reasons, backed up by examples, for classifying organization, planning, and preparation tasks as interactive or as analytical.

Our interest lies primarily on differentiating between "routine" and "non-routine" tasks. All the studies mentioned above take these categories to be central for estimating the technical potential of replacing human labor. Although they all conceptualize "routine" as the most decisive category for assessing the effects of technical change in terms of the extent to which tasks can be automated, they contain only rudimentary attempts to define it. Ultimately, all task-based approaches set out from the hypothesis of *routine-based technical change* (RBTC) (Fernández-Macías & Hurley, 2014, p. 37) and almost always equate routine with repetitive, monotonous work. Further elaboration of the concept of routine is rare. Alda (2013, p. 8), however, does remark in a footnote to the discussion of routine in the ALM classification that "[t]he concept of the routine does not refer to people describing or experiencing certain jobs as monotonous, lacking in variety or anything like that, or to people being habituated to something. It is about whether or not technology has progressed so far as to completely take over the task." Indeed, a "good and useful" definition of routine tasks is a "non-trivial" problem (ibid.: 12). By this, ALM mean that "the experience-based knowledge of the employee takes on a higher significance" in non-routine tasks (ibid.: 15). However, although this comment provides a bit more clarity, it does not in our opinion resolve the basic difficulty, because what experience-based knowledge actually is—and in what sense it becomes important on a daily basis for different tasks—cannot be derived solely from the perspective of technical experts and their ideas about the tasks.

Fernández-Macías and Hurley (2014, p. 48) also note that the wide classifications of routine work, made on the basis of O*NET data for the United States, "are not good measures of routine" because they ultimately derive from antiquated notions of

production work: “Using physical and quality control variables for the routine task index makes sense if we look at traditional production line jobs that involve mostly manual work and basic tasks with machines,” they write. “But the routine content of some jobs may be overestimated or underestimated when relying on these two variable categories” (ibid.). In their own analysis, they conclude that “the extent of routine in different jobs...is not the key driver behind polarization—if anything, it is more related to upgrading, in a similar way as the cognitive index” (ibid.: 69). Because this quantitative finding is consistent with a great range of qualitative findings from the sociology of work literature focusing on *subjectifying work action* and *living labor capacity*, we now focus on this connection, so allow us to initially introduce both concepts:

- The concept of *subjectifying work action* (Böhle, 2013) begins with the individual at work, in possession of the full range of human capacities. We need reason and logic to respond correctly under pressure, but we also need intuition, “gut feeling,” and emotions. Humans are not completely brain-driven, we also have bodies. Our bodies “know” and feel; they transmit visual and tactile sensations, and through our bodies we grasp contextual relationships that may not be immediately accessible through logic. These abilities often take time to develop, which is why usually only experienced employees possess them. Theoretical knowledge and routine serve to help with standardized processes and repetitive tasks. Subjectifying action and knowledge, however, is quite different, being defined by four central characteristics: a) holistic perception, b) exploration and dialog, c) intuition and “feeling,” and d) an empathetic relationship. The concept understands experience neither as basically inferior to theoretical, scientifically grounded knowledge, nor does it see it as a quality to be completely replaced by the latter. *Subjectifying work action* is of great significance as an autonomous form of action and knowledge both for planning and practical action as well as for creative, innovative processes that form the basis for coping with unforeseen circumstances. However, an understanding of experience in this sense merely as a set of experiences, which have been acquired, is not sufficient. The perspective of *having* experiences also refers to a given moment and situation and to specific action methods used to tackle specific situations.
- The analytical conception of *living labouring capacity* (Pfeiffer, 2014) draws on Kluge and Negt (2014), and transforms Marx’s dialectical distinction between the use-value (labouring capacity) and the exchange-value (labor power) into an operationalized model that could be and has been successfully used for empirical studies of digital labor. Labouring capacity has three levels of phenomena: subjectifying corporeal working action, material means and objects of work (even in virtual environments), and the socially and physically experienceable face of globalized work organization. *Labouring capacity* and labor power are two fundamental aspects, each undergoing historically conditioned change and each behaving in a dialectical relationship to each other that can only be separated clearly into quantitative and qualitative components analytically. Humans develop *labouring capacity* constantly through the course of their life, applying subjectifying action to all environments they encounter and embracing all dimensions of reality in their everyday life

within and beyond what we today call the work place. Hence, *labouring capacity* is not only historically specific, but always more than a unique situation, a single task, or a specific job demands to adopt. This fact and the embodied and immanent qualitative nature of *labouring capacity* makes it a potentially interminable well for creativity, out of the ordinary solutions, and ad hoc improvisation—a truly genuine potential of our species being, not at all reserved for the so-called creative class (Florida, 2012). Labouring capacity could be seen as a human potential that capitalism relies on without understanding it, exploits it without being able to quantify it, and neglects it even when economic logic thrives to unfold it.

Based on these analytical concepts, the author's own workplace investigations (AUTHOR, 2016) have nonetheless shown that, speaking of routine, things are not as simple as Frey and Osborne claim. For example, let us visit a typical automobile assembly line in a German car manufacturing plant—already highly automated, and with a count of one employee for every robot. But the work done by such employees is far from routine. They supervise eight robots, and in a normal work day, intervene in this highly complex process between 20 and 30 times. In order to do so, they not only require a great deal of specialist knowledge (about programming robots, for instance, or welding technologies) but also context-specific knowledge (concerning quality control, for example, and upstream and downstream processes), as well as experiential knowledge (about the causes of previous disturbances, wear and tear, the way materials react to temperature changes, and so on). Workers frequent interventions are sometimes responses to irregularities or disturbances, but mainly serve to ensure that these do not arise in the first place. What we encounter here, then, is a striking contradiction: while in highly complex and heavily digitized production environments, the significance of living labor is quantitatively decreasing, its role in maintaining these complex production processes is becoming ever more important. This fact nonetheless remains invisible to most statistical approaches to the issue.

Contrary to what is implied by Frey and Osborne (2017), experience here would then seem to be an expression of non-routine activity and its importance in complex and heavily automated and digitized working environments (Hirsch-Kreinsen, 2016). This was already shown by studies conducted in the 1980s on the transition from traditional machines to CNC⁵ tools (Böhle & Milkau, 1988) and on the management of complex operations in the process industry (Böhle, 1994). These studies indicated the importance of “subjectifying work action,” whose central dimensions include holistic perception, an explorative and dialogical approach, intuition and instinct, and an empathetic bearing. While specialist theoretical knowledge and routine-based practices are important in standardized processes and repetitive, unchanging tasks, subjectifying action helps employees to deal with the (yet) unknown. The notion of subjectifying work action thus recalls those aspects of knowledge and action that figures such as Polanyi (1983) and Dreyfus (1992) identified as hidden and informal and—as genuine human capacities—superior even to intelligent forms of technology. A range of empirical studies have lent further weight to the notion of subjectifying work action and highlighted its significance

⁵CNC = Computer-numerical controlled.

in various work-related tasks, particularly in non-routine situations. *From the perspective of qualitative labor research, then, the customary distinction between knowledge work as a non-routine activity and production work as a routine activity does not stand up to close scrutiny.*

More recent studies have also demonstrated that the increasing globalization and standardization of production systems, along with their associated technological transformations, have made production work more complex and thereby increased the significance of non-routine activities. The importance of a “high-tech instinct” was indicated by Bauer et al. (2006) in their study on process chemistry—an area marked by particularly high levels of automation and the early introduction of process management IT systems. Other studies have shown that in automobile assembly and serial production processes, employees increasingly have to deal with more rather than less complexity (Levitt, List, & Syverson, 2012), even when carrying out so-called “simple” work. Such developments have been observed in the very areas in which robotics have long played an important role (Pfeiffer, 2016).

Qualitative studies at the shop floor level and in the production sector have come to very different conclusions than quantitative labor market research did, which tends to make rather far-reaching predictions about automation-induced job losses on the basis of its findings. What qualitative studies bring to light, then—namely the ongoing centrality of living labor, even for value creation—vanishes when we adopt a quantitative perspective. What is crucial here is that the significance of living labor cannot simply be described as a residual element that has somehow retained its relevance. The following study is built on the working assumption that a combination of qualitative diagnoses of human-machine interaction at the micro-level with quantitative labor-market data at the macro-level will yield insights into likely future developments in the organization of work that neither approach could generate in isolation. Our goal is not to offer specific prognoses but rather to improve the methods of studying relevant developments and to build a basis for the continuous and early reporting of qualitative change in firms and jobs using the large-scale data generated by research into employment and occupations. *The increasing qualitative significance of living labor in the face of its quantitative reduction is rather an immanent consequence of the contradictions in the dominant modes of production and the current leap in productive forces resulting from digitization.*

3 Measuring Non-Routine

On the basis of US labor-market data and expert opinion, Frey and Osborne offered prognoses about the extent to which current and future digital technology will lead to workforce reduction and to changes in the labor market as a whole. They were guided by the assumption that technological progress faces no hindrance except for “engineering bottlenecks”—job tasks that are especially difficult to automate—specifically including “perception and manipulation tasks, creative intelligence tasks und social intelligence tasks” (Frey & Osborne, 2017, p. 262). Their analytical approach is thus “task-based,”

which offers two decisive advantages in the current context. First of all, technological change at the workplace is no longer exclusively tied to what the firm does but is also influenced by employees' personal digital devices and their habits of using them. Second, the division of labor between humans and machines plays out in its most particular and decisive form in the context of specific job tasks, and it is on this level that we actually see the division of labor shifting or reconstituting itself because of changes in the relationship of technology and work.

Quantitative analyses of large job task datasets may lack the nuance and face validity of studies based on qualitative data, including, for example, sociological case studies of specific businesses and anthropological studies of specific job environments. However, quantitative data does allow for assessments of changes in work over time and across economic sectors, so they should be given serious consideration as long as their limitations are handled appropriately. Given the qualitative studies on the significance of non-routine tasks in production work presented in section two are of empirical relevance, is there a way to quantify the share of non-routine tasks and therefore human labor that is not that easy to replace? In the present section, we shall do this on the basis of the 2012 BIBB/BAuA Employment Survey (Rohrbach-Schmidt & Hall, 2013). This is an occupation-based representative survey that has been repeated at regular intervals since 1979. The survey asks around 20,000 employees in Germany about changes in their work and their occupational roles.

We do not ask which tasks can be labeled as "routine" or "non-routine" tasks following some pre-defined criteria or assumptions. Instead, we search for components of the non-routine *within* tasks. Thus, the first step does not involve looking at all activity items but rather at items that best reflect the characteristics associated with experience.

We do not ask for expert opinion about the feasibility of automation, nor do we make inferences about feasibility based on assumptions. Instead, we try to identify components of the non-routine using the *subjective assessment* of respondents (as far as this is at all possible using items from the BIBB/BAuA Survey) across all activity items.

We assume that the routine/non-routine dichotomy generates very little traction. No activity is purely routine or purely non-routine. Instead, we postulate a routine/non-routine continuum, or, better yet, an *experience continuum*, in every activity. This does not preclude large differences in the relevant dimensions and qualities, in the components themselves, or in the relative significance of the non-routine (or experience).

We avoid the tendency to reproduce the common bias (which creeps in despite having virtually no basis in qualitative research) in the classification of manual work and brainwork such that, implicitly or explicitly, work with machines is equated with routine whilst work with knowledge is equated with creativity. Instead, we look first for non-routine components and then, on this basis, we check the extent to which these components are found in different tasks, branches, and qualification levels. Instead of identifying the routine on the basis of typical activity-based categorizations, we put the task-based approach back on its feet and begin with experience. With this *experience-based approach*, we hope to generate new insight especially about which tasks are most susceptible to automation.

Above all, using concepts and empirical findings from research on subjectifying work action and labouring capacity, it is our intention to overcome the tendency to equate

“routine” with simple, repetitive tasks in the sense of an unchanging load of experience. Guided by the conceptual and empirical perspectives noted above, we conceptualize experience not just as something that can be acquired and “had” but rather as an ever-adapting ability to gain more experience. This ability proves useful especially in dealing with unforeseen circumstances, above all when uncertainty about specific work action prevails. It is useful when decisions have to be made under deadline pressure and without planning, and when decisions have to be implemented successfully—defined for example as free of negative economic repercussions—even without sufficient information or in the absence of all necessary skills. As noted in section three, such situations arise even among untrained assembly workers who, in spite of the fact that their main activity is repetitive, anticipate and prevent the causes of disruptions in production. Based on the logic of the classic ALM classification, this activity would be classified as an easily replaceable, routine manual activity. Based on the logic of Frey and Osborne’s schema, the same activity would be classified as *engineering bottleneck* “*perception and manipulation*” because it may be characterized by a high share of manual labor in a constrained space and possibly also by the necessity of working in uncomfortable bodily positions.

The aim of the now introduced steps is *not* to predict the probability of automation in light of new technologies, but rather to highlight the limits of such forecasts. The following elaboration of an appropriate index attempts to make human living labor “measurable.” Our starting point here is the contemporary qualitative research outlined in *section two*. The index incorporates both situational and structural challenges for employees resulting from complexity, change, and unpredictability in the workplace (c.f. Pfeiffer & Suphan, 2015). The *labouring capacity* index (LC) is comprised of three components and a multiplier, and is generated as follows:

- The *sitCOM index component* stands for “*situation-specific handling of complexity*.” Here, three items measure the frequency of which employees engage in situation-specific problem-solving and decision-making activities, both alone and in collaboration with others.
- Seven further items make up the *sitUP index component and measure “situation-specific unpredictability”*: A large amount of subjectifying work action is required when under time pressure, when unpredictability is in play or has to be prevented proactively, and when improvisation is necessary due to the lack of sufficient information, knowledge, and/or skills at the right moment and when non-decision can result in bigger problems.
- The *strCOM index component*, likewise comprised of seven items: When changes in work equipment, work objects, or work organization occurred during the previous two years with repercussions for the immediate work environment, if they are concurrent with an increase of stress. An increase of stress may indicate an intensification of work as a result and/or in the context of additional demands brought on by change. We interpret an increase of stress as an indicator that acquiring experience has become more difficult.

- *Multiplier "Relevance of Acquiring Experience (rEX)"*: If a long training period in the firm is necessary for carrying out a task, this can indicate a need for subjectifying action. Indeed, the mastering of work contexts characterized by complexity and unpredictability is more likely to be learned on the job, not through textbooks or instruction manuals. rEX is coded so as to vary between 0 and 1. It is of central importance for the index because, as a multiplier, it modifies all other values. If rEX= 0, the index value is set to zero, indicating zero subjectifying work action. In this case, we do not assume that the task actually requires zero experience but rather that the proportion of experience necessary to carry it out is very low in comparison to other tasks and thus will very unlikely serve as a barrier to automation.

The LC-Index is multidimensional, as one would expect from the conceptual and empirical foundation that underlies it. All indicators show a significant correlation to each other (Spearman Rho significant at .01).

The LC index can be calculated for a total of 17,479 cases. This yields a score of 0 for 16.9% of the workers surveyed, and a score of under 0.5 for a further 9%. Respondents with a score below the theoretical average would seem to require a very low or by comparison with the comparatively coarse items—unobservable level of labouring capacity. By contrast, high scores were recorded for 48% of workers, and very high scores for a further 26%. The measurable index scores (LC >0) are normally distributed. The LC index mean score was 0.56 ($N_{LC}=17,479$; $SD=0,281$) and exhibited a slight tendency toward higher index scores. Overall, an LC index score of over 0.5 was registered for the occupations of 74% of all workers surveyed. The majority of employees in Germany had therefore developed informal skills to help them deal with unpredictability, change, and complexity. This high score shows that the contrast usually drawn between routine and non-routine tasks is inadequate.

Although vocational training in Germany shows signs of stagnation (Nicklich & Fortwengel, 2017), a majority of the German workforce still does have a vocational qualification. Therefore, we now interpret the LC-Index in terms of formal qualification level, differentiating four levels of the highest qualification certificate acquired: cases with no training or academic education, cases with a vocational training certificate, higher non-academic qualification (technicians and master craftsmen), and finally academic degrees. Persons in the sample with no formal qualification show an under average mean LC-Index value of 0.38 ($N_{LC}=1158$; $SD=0.325$). All others have LC-Index values above the theoretical mean of 0.5: Persons with a vocational training certificate score an average mean value of 0.54 ($N_{LC}=10,153$; $SD=0.289$) technicians score highest with a mean of 0.64 ($N_{LC}=1,477$; $SD=0.224$), and thus even higher than those with an academic degree who had an average mean value of 0.61 ($N_{LC}=4,686$; $SD=0.240$).

The LC-Index values among the least qualified shows a very wide distribution with the lowest quartile extending almost to LC-Index = 0, and the highest quartile reaching over 0.65. This result can be interpreted as indicating that the group of persons with the lowest level of formal qualification carry out a great variety of tasks with great variation to the extent to which their jobs require them to use experience to overcome complexity. This strongly suggests that the formal qualification structure alone sheds little light on

the degree to which tasks are dominated by routine. Indeed, the wide distribution affirms qualitative studies which show that “simple” work is, upon closer inspection, often much more complex than it first appears (c.f. Lacher, 2006).

4 Non-Routine and the Highly Automated Shop-Floor

Frey and Osborne see machine-based labor as particularly susceptible to automation, in two respects: first, such work largely consists of routine tasks; second, production is seen as the most important area of application for new developments in Industry 4.0 automation and robotics. *Table 1* shows to what extent Frey and Osborne (2017, pp. 269–278) see machine-related occupations as susceptible to future technological change. Most of them score with a probability of computerization of 90% or way beyond that, thus, they are ranked as most-computerizable. The table contrasts these figures with mean LC-values for similar occupations in Germany (ISCO code 08, three digits); the majority showing scores above the theoretical mean between 0.5 and 0.63. Only machine feeders and production workers without a specific vocational profile score below. The comparison shows that at least in Germany with its traditionally strong vocational system, workers in the field of production often do cope with change, imponderability, and complexity, applying non-routine capabilities much more than assumed by Frey and Osborne.

The industrial branches of automotive and mechanical engineering (and within these, the domains of production and assembly) are key to the implementation of Industry 4.0 and novel approaches of automation and robotics. Of all respondents, first we consider mechanical and automotive engineering (N=1.196), along with machine-based occupations, i.e., those that the studies discussed above regard as highly routinized and particularly susceptible to automation. We shall turn to the LC index scores generated for occupations that are particularly relevant to Industry 4.0 amongst all industrial branches. Occupations were selected from the areas of mechatronics and of production planning, which both currently represent modernized vocational occupations and mostly include IT related tasks, e.g., programming and monitoring-embedded systems. We here selected occupations according to the German classification of occupations (Klassifikation der Berufe–KldB), which aligns much better with the vocational system in Germany than the ISCO codes. Surprisingly high scores, for example, were recorded for machine and production-based occupations with a higher share of IT-related requirements like “mechatronics and automatization (KldB 242)” with $\bar{\emptyset}$ LC=0.71 (SD=0.145; N_{LC}=34) or technical production planning and monitoring (KldB 273) with $\bar{\emptyset}$ LC=0.67 (SD=0.228; N_{LC}=272).

The results clearly show that employees in the automotive and mechanical engineering as well as in other industrial branches—even those engaged in machine and production-based work—are often confronted with unpredictability, change, and complexity. The idea of dull routine work therefore does not apply here, and the quantitative figures support the qualitative research presented above. The figures further show that technical vocational training seems to provide the appropriate capabilities, and that non-routine work is something to be considered as functional on the shop floor and not only as a characteristic of academic qualification.

Table 1: Machine related occupations—comparison of susceptibility according to Frey and Osborne (2017) with share of non-routine (LC-Index)

Frey/Osborne (2017) Probability of Computerisation			LC-Index (share of non-routine tasks)					
Rank	Probability	SOC	Occupation	N _{LC}	Mean	SD	ISCO 08	Occupation
678	98.0	51-4035	Milling & Planing Machine Setters, Operators, Tenders	207	0.63	0.242	7223	Metal working machine tool setters and operators
653	97.0	51-9022	Grinding and Polishing Workers, Hand	207	0.63	0.242	7224	Metal polishers, wheel grinders and tool sharpeners
648	97.0	51-2023	Electromechanical Equipment Assemblers	49	0.50	0.352	8212	Electrical and electronic equipment assemblers
620	95.0	51-4072	Molding, Coremaking, Casting Machine Setters, Operators...	133	0.51	0.294	7211	Metal moulders and coremakers
624	95.0	51-4033	Grinding, Lapping, Polishing, Buffing Machine Tool Setters...	207	0.63	0.242	7223	Metal working machine tool setters and operators
621	95.0	51-2022	Electrical and Electronic Equipment Assemblers	49	0.50	0.352	8212	Electrical and electronic equipment assemblers
598	94.0	51-4121	Welders, Cutters, Solderers, and Brazers	133	0.51	0.294	7212	Welders and flamecutters
590	94.0	51-4032	Drilling and Boring Machine Tool Setters, Operators, ...	207	0.63	0.242	7223	Metal working machine tool setters and operators
581	93.0	51-4061	Model Makers, Metal and Plastic	207	0.63	0.242	7222	Toolmakers and related workers
587	93.0	51-4022	Forging Machine Setters, Operators, and Tenders, ...	207	0.63	0.242	7223	Metal working machine tool setters and operators
584	93.0	51-9041	Extruding, Forming, Pressing, Compacting Machine Setters...	33	0.66	0.249	8141	Rubber products machine operators
580	93.0	53-7063	Machine Feeders and Offbearers	192	0.32	0.343	9329	Manufacturing labourers not elsewhere classified
572	92.0	51-9399	Production Workers, All Other	192	0.32	0.343	9329	Manufacturing labourers not elsewhere classified
560	91.0	51-4021	Extruding and Drawing Machine Setters, Operators, Tenders...	207	0.63	0.242	7223	Metal working machine tool setters and operators
552	91.0	51-4081	Multiple Machine Tool Setters, Operators, Tenders...	207	0.63	0.242	7223	Metal working machine tool setters and operators
558	91.0	49-3021	Automotive Body and Related Repairers	342	0.62	0.264	7231	Motor vehicle mechanics and repairers
554	91.0	49-2093	Electrical & Electronics Installers & Repairers, Transportation.	233	0.62	0.261	7412	Electrical mechanics and fitters
539	90.0	51-4062	Patternmakers, Metal and Plastic	207	0.63	0.242	7222	Toolmakers and related workers

5 Coping with Automation is more than Routine

Automation, first of all, aims to replace workers, and those in production, again, are seen as the first to be fired according to recent studies like that by Chui et al. (2015) or by Frey and Osborne. Their conclusions on the replaceability of human labor with robotics, algorithm, and other novel representations of 4.0 automation are based on a notion of routine work that has been neither empirically nor theoretically validated, but contradicts qualitative research in the area, which showed that it is obvious that in highly automated environments, non-routine tasks play a central role. This study tried to quantify that by introducing an index that makes evident what so often is overseen and neglected: phenomena of living human labor. The results point towards the special role of vocational training. Those applying Frey and Osborne's US-based study to Germany (Bonin, 2015) often assume a one-to-one correspondence of the two economies, but the qualification structures of US and German labor markets are actually not very similar. In Germany, the variety of employment categories is greater than anywhere else in the world. As a result (and a necessary condition) of the high complexity of its national economy—indeed, it is one of the most complex economies in the world—an extraordinarily high number of employment categories are involved in the production of most German goods (Hidalgo & Hausmann, 2009, p. 10573). Even within the EU28, Germany has an exceptional status. It takes, on average, 70 different occupations (ISCO categories) to account for 50 percent of employment in any given sector (NACE categories) of the German economy. In the European Union as a whole, 65 jobs suffice, and in the majority of countries, the value is much lower, ranging between 30 and 50 (Fernández-Macías & Hurley, 2014, p. 87). Germany may be a special case as its special status is probably best explained by its highly differentiated dual vocational training system; two-thirds of all employees in Germany are still dual-trained (Bosch, 2014). Although non-routine is a global phenomenon, employees with a formal vocational training seem to be adapting highly to requirements at the worksite that come with complexity, change, and imponderabilities. Our results reveal deficits not only in human factors of production, but also in firms and in the established forms of technology development and work organization. If there is anything that cannot be duplicated in an increasingly digitalized world, it is the unique variety of formal qualifications of Germany's workforce. The dual system of vocational apprenticeship and professional development has created a diversely qualified middle class in Germany, in contrast to most countries in the world. Not only does this significantly increase the German economy's capacity for innovation—an assertion supported by our analysis. It also gives rise to the fact that not just a small group of highly qualified employees, but indeed the majority of Germany's employees are capable of dealing with complexity and unpredictability. Experience as a dynamic resource instead of static routine: human labouring capacity, in all its diverse and under-appreciated facets, is a major reason why individuals can learn to deal with complexity and unpredictability. As has already been recognized, it is this ability, which we have tried to measure quantitatively using the LC-Index, that enables us to engage the increasingly significant “ironies of automation”: “[t]he more we depend on technology and push it to its limits, the more we need highly-skilled, well-trained, *well-practised*

people to make systems resilient, acting as the last line of defense against the failures that will inevitably occur" (Baxter, Rooksby, Wang, & Khajeh-Hosseini, 2012, p. 65, our own italics).

The central question regarding the link between non-routine work and Industry 4.0 is thus not: Which tasks potentially could be lost to automation *tomorrow*? The more relevant question is instead: How can the specific potential of living labor be used and recognized for the formation of Industry 4.0 *today*?

Industry 4.0 technologies will result in deep changes in production, assembly, and maintenance work. This has nothing to do with the introduction of one new technology (such as with the introduction of laser technologies a few years ago). Industry 4.0 bundles a variety of new technologies and application scenarios, all of which vary in terms of the maturity of the technology involved and the systemic effects they set off. In Industry 4.0, future forms of automation will be more disruptive and risky because they introduce a wholly new quality of demands on performance.

Industry 4.0 should be seen as an innovation process for a productive environment in which established procedures for incremental automation along known technological paths and using well-practiced teams are reaching their limits. Industry 4.0 does not involve simply automating already-established manufacturing routines but rather managing and forming the innovation process, which is itself open-ended and to some extent never fully plannable. At the same time, however, new technologies and their advantages have to be integrated into a more and more mass-customized, personalized production robustly and quickly. Even in the early phases, plant availability must not be endangered.

Innovators often lack specific production and process knowledge: Many relevant technologies originate not in established R&D (research and development) labs of the capital goods industry but in information technology. With applications like big data, there is often a lack of specific knowledge about production technologies and little experience with production processes that involve the handling of materials. Industry 4.0 companies coming from the IT industry often have no sense for the exigencies that arise in the highly synchronized mass production of technologically sophisticated products. The high dynamism and the high variety of technical possibilities are often too much for even top decision makers and management to cope with. In this environment, solutions to problems are implemented that unnecessarily increase complexity and thus put plant availability at risk.

Long- practiced forms of work organization and regulation are approaching their limits: Established processes and institutions of codetermination or of the regulation of worker safety and data security are failing to adapt quickly enough to technological innovation. It is becoming ever more difficult to keep an eye on every relevant issue and intervene in a timely manner. Even already-introduced technologies change through software updates more often and more significantly than in the past, which necessitates new assessments and possibly new rules of data security and worker safety. New procedures have to be developed in order to avoid getting stuck in an exclusively reactive posture.

Skilled employees are needed more than ever and must be able to do more, but the areas in which they work are perceived as unattractive: Industry 4.0 will increase the

need for more highly qualified and more narrowly specialized warranty operations in many areas of production, assembly, and maintenance. Intelligent processes increase systemic complexity through their sensors and algorithms. Human workers will thus need to apply much more specialized knowledge and experience-based knowledge than ever when disruptions occur, although they will occur less often. Yet, current production-line jobs are still highly constrained by shifts and clocks and are thus not attractive for highly qualified technicians. The demands on those who must create good jobs and recognize good performance are thus also increasing.

Generate sustainable competitive advantages that are not easily copyable: On one hand, the early integration into production of Industry 4.0 technologies is necessary from the perspective of generating competitive advantages, but on the other hand, this strategy is also a source of risk and expense. Technologies that are in a beta-testing phase today will be the standard in a few years. Competitors can catch up by implementing them with less risk and cost. Sustainable competitive advantages can be secured only when specific, not easily copyable applications are developed. The strategically most important interface, and the one that needs to be given the most attention, is the division of labor between human and machine, between human experience and algorithm.

These challenges can be best met by including the 74 percent of the German workforce that already possesses a high amount of experience-based knowledge and is coping with non-routine tasks day-by-day in the early *formation* of Industry 4.0. To design this formation towards a successful transformation, the needed resource is already available: employees' labouring capacity. However, there is no great participatory tradition for innovation in technology development, which brings up the issue of how it can be introduced. What changes are necessary in our still quite rigid and still very hierarchical corporate organizational structures that would allow employees to utilize their capabilities in self-organizing, agile innovation processes across corporate divisions and across disciplinary lines? How can the experienced-based knowledge of employees be brought into *participative processes of technology development*? And how, finally, can the new jobs that are created be organized within innovative processes and participatory organizational forms so as to guarantee that *innovative work environments* arise in which people are able to develop living labouring capacity? This is necessary if, in the future, those workers are to be enabled to deal with complexity and unpredictability, most especially in an Industry 4.0 setting. In other words: How can Industry 4.0 on the factory floor be organized as an innovation process by and with the employees?

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Professional Desires and Career Decisions: Effects of Professional Interests, Role Models, and Internship in Lower Secondary School

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Abstract

Context: Following the social cognitive career theory of Lent, Brown, and Hackett (1994), the current study examines the effect of role models' professions and practical internship experiences on the choice of professional environment independent of professional interests. Embedded in the Swiss context with its strong vocational training system, the paper outlines to what extent the desired professional environment is realized in the chosen apprenticeship two years later and how this realization can be predicted. The theoretical model proposes that students form direct professional experiences during their first internship(s). If those experiences are positive, students choose an apprenticeship in the same professional environment. Students have indirect (vicarious) professional experiences through their role models. If those experiences are positive, students choose an apprenticeship in the role model's professional environment. The study examined whether, independent of professional interests, direct experiences in internships and indirect experiences through role models' professions predict the realization of a desired professional environment in an apprenticeship.

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Method: The longitudinal sample consists of $N = 348$ seventh- and ninth-grade students from four German-speaking Swiss cantons. Professional interests and environments were measured using standardized questionnaires. The professional environments of the desired professions, the chosen apprenticeships, the role model's professions, and the internship's professions were coded using Holland's (1997) interest types: realistic, investigative, artistic, social, enterprising, and conventional (RIASEC).

Results: In 53% of the cases, students chose an apprenticeship in the professional environment they desired. In 53% of the cases, the chosen professional environment corresponded with the professional environment of the student's two most important role models. In 39% of the cases, those role models were their parents. By means of logistic regression analyses, we can show that role models' professional environments and the professional environment of the first internship influenced the realization of the desired professional environment at the end of lower secondary school, independent of the effect of the individuals' interests.

Conclusions: Results show that direct professional experiences in internships and indirect experiences of role models influence the realization of the desired professional environment, independent of professional interests. In a contextual approach, career counselling should include the role model's profession and how it corresponds with the client's interests and professional desires. Moreover, role models, especially parents, have a responsibility to reflect on how their goals influence students' career choice processes.

Keywords: VET, Vocational Education and Training, Career Decision, Professional Role Model, Internship, Professional Interest

1 Theory

In secondary education, students typically have to make first career choices to prepare for lifelong professional development. In Switzerland, about two-thirds of students choose an apprenticeship after compulsory school (Babel & Laganà, 2016). Prior studies examined the determinants of the choice between an academic track (via high school) and a vocational track (via vocational education and training [VET]; Neuenschwander & Malti, 2009; Neuenschwander, Fräulin, Schumann, & Jüttler, in press) and of the fit between students' needs and school contexts (Neuenschwander, 2011). However, little knowledge exists about how students choose a professional environment (content or professional field) in their career decision processes. Lent, Brown, and Hackett (1994) proposed the social cognitive model of career choice. Career choice is predicted to some extent by students' professional interests, professional desires, role models' professions, and career activities (e.g., internships [Schnupperlehre¹]).

¹In the Swiss context, internships are 3- to 5-day apprenticeships where students in lower secondary education work in a company. Internships help students learn more about professions. Companies evaluate students in internships to help them decide whether they want to hire students as apprentices.

In this study², we test a part of the model of Lent et al. (1994), and we consider the following questions:

1. To what extent do the desired profession and the chosen profession correspond with the professional interests, role models' professions, and profession of the first internship?
2. How often do students choose an apprenticeship in the profession they have desired to?
3. To what extent can the realization of the professional desire be predicted by professional interests, role models' professions, and profession of the first internship?

1.1 Career Decision Model

Lent et al. (1994) assumed that career decisions result from professional goals that correspond with professional interests and that are explored in career activities. Career decisions also result from influences of reference persons in the proximal context (role models such as parents, relatives, neighbours and others). Many aspects of the model were tested in various professional domains and for various groups, such as genders and migrants (meta-analysis from Lent, Sheu, Miller, Cusick, Penn, & Truong, 2018).

In the social cognitive career choice model, professional desire is a key component of professional goals (Lent et al., 1994). Studies showed that educational attainment expectations predict the probability of college enrolment (Eccles, Vida, & Barber, 2004). However, little research investigated whether early-desired professional environments are realized in apprenticeships (Tomasik, Hardy, Haase, & Heckhausen, 2009). We understand professional desire as a rough preselection from many possible professional environments. It serves as a point of reference to evaluate future professional options. In line with Lent et al. (1994), we assume that professional desires tend to be realized. Thus, students choose a profession in VET that corresponds with their professional desires.

1.2 Professional Interests, Role Models, and Internships

The social cognitive career choice model explains the change of profession between the professional desire and the chosen apprenticeship. Within the model, we focus on the effects of professional interests, role models' professions, and profession of first internship on the realization of the professional desire. The model proposes that these three variables directly explain the conditions under which professional desires are realized in upper secondary education.

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Professional Interests

Professional interests predict professional desires and the apprenticeship's profession (Bergmann & Eder, 2005; Lüdtke & Trautwein, 2004; Walsh, 1999). The framework of the social cognitive career choice model assumes that self-efficacy and outcome expectations affect professional interests that in turn affect chosen goals (Sheu, Lent, Brown, Miller, Hennessy, & Duffy, 2010) and career decisions. Professional interests are defined as the extent to which an individual likes a particular activity, academic subject, college major, or profession (Sheu et al., 2010). Students are interested in several professional environments. A person's most distinctive type of professional interest prominently steers his or her choice of professional environment. The type of interest in a specific environment predicts the professional desire and the realization of the desired profession.

In line with Holland's model, we hypothesize a high positive correspondence between the person's type of interest and the desired professional environment (Hypothesis 1a), as well as of the chosen apprenticeship (Hypothesis 1b). We also hypothesize that the correspondence between the person's type of interest and the professional environment of the chosen apprenticeship predict the probability that the desired professional environment corresponds with the chosen professional environment (Hypothesis 1c).

Role Models

The model of Lent et al. (1994) assumes that role models influence students' professional desires and career choices. Because of their holistic character, role models serve as examples of successful professional life careers that are worth copying (Makarova & Herzog, 2014). Most students between the ages of 10 and 14 report having a role model (Zinnecker, Behnken, Maschke, & Stecher, 2003). If students have role models, they most often are relatives like parents, uncles and aunts, or neighbours (Zinnecker, 2003). Role models exemplify professions that students become aware of, start thinking about, and imitate (Bandura, 1977). Students have indirect experiences by observing their role models and listening to their stories about their professions. Typically, students have close relationships with their role models and internalize their interests. Role models who present positive pictures of their professions make their professions attractive for the students (indirect experience). If the indirect experience is positive, the student chooses an apprenticeship in the role model's professional environment. Thus, role models' professional environments influence students' desired professional environments and their choice of professional environment in their apprenticeship.

We hypothesize a correspondence between the role model's professional environment and the student's desired professional environment (Hypothesis 2a), as well as that of the chosen apprenticeship (Hypothesis 2b). We also hypothesize that the correspondence between the role model's professional environment and the professional environment of the chosen apprenticeship predicts the probability that the desired professional environment corresponds with the chosen professional environment (Hypothesis 2c).

Internships

Moreover, Lent et al. (1994) proposed that professional desires are explored through internship activities. Students reported that their internship experiences strongly influ-

ence their career choices (Beinke, 2013; Neuenschwander & Schaffner, 2010). Students choose internships that correspond with their professional desires. According to Lent et al. (1994), in internships, students form direct professional experiences and explore their desired professions. If students decide to complete an internship in the desired profession and if they have positive experiences in this internship, they will likely choose an apprenticeship in the same professional environment. Occasionally, students do not like the internship, and they find new professional options in the same or another professional environment (Beinke, Richter, & Schuld, 1996). Thus, the internship allows students to test their hypotheses that a desired profession fits with their interests and competencies. If the students like the internship and get positive feedback, they try to get an apprenticeship in that professional environment. If the students do not like the internship and/or get negative feedback, they look for other professional environments that fit with their interest and competencies.

We hypothesize a high correspondence of the professional environment of the first internship with (Hypothesis 3a) the desired professional environment and (Hypothesis 3b) the chosen professional environment. We also hypothesize that the correspondence between the professional environment of the first internship and the professional environment of the chosen apprenticeship predicts the probability that the desired professional environment corresponds with the chosen professional environment (Hypothesis 3c).

1.3 Types of Interest and Professional Environments

Holland (1997) proposed a person–environment–fit model: Students choose careers in professional environments that fit their personalities. The model assumes that people prefer professional environments that correspond with the types of the professional interest. The more precisely the interest corresponds with the professional environment, the higher are job satisfaction, stability, and performance (Nauta, 2010). Holland (1997) distinguished the RIASEC interest types, a constellation of professional interests, preferred activities, beliefs, and abilities (Nauta, 2010). Because no person corresponds only to one type, the three most dominant RIASEC types (expressed with a three-letter code) are typically used to describe a person’s professional interest pattern (Nauta, 2010). The professional environment that students are most interested in is coded with the first letter, so this first letter of the three RIASEC codes is most characteristic. Likewise, work environments can be categorized by the RIASEC codes. Again, the first code is the most important one. We use the first letter of the RIASEC model to categorize the person’s type of interest and the professional environments.

Prior research showed that gender influences the choice of professional environments (Hirschi, 2009). The gender gap with male dominance in the fields of science, technology, engineering, and mathematics (the so-called STEM subjects) has been well documented in most OECD countries (Jarman, Blackburn, & Racko, 2012). Makarova, Aeschlimann, and Herzog (2016) assumed gender-typed pathways because of gender stereotypes and gender roles. While males are most interested in realistic and investigative contexts, females prefer social, artistic, and slightly less distinctively enterprising environments. Both genders are equally interested in the conventional environment (Hirschi, 2009). In

2006, the majority (77.2%) of male apprentices in Switzerland learned a profession in a realistic environment, and about 17.7% took an apprenticeship in a conventional environment. Most female apprentices chose a conventional environment (40.7%), with the second-most female apprentices in social environments (24.8%; Hirschi, 2009). Because of the strong gender effects on the choice of professional environment, we will control for gender while testing the hypotheses.

1.4 The Swiss Context

This study was conducted in the Swiss German-speaking cantons Aargau, Basel-Landschaft, Berne, and Lucerne. Depending on the canton, the decision of gymnasium enrolment has to be made in eighth or ninth grade (in the canton of Lucerne, students also can choose to attend a long-term gymnasium starting in seventh grade). All students leave compulsory school after ninth grade (at about age 16). The various upper secondary education courses in Switzerland can be grouped into two main pathways: gymnasium and upper secondary specialized school (academic track) and VET (dual or full-time vocational school, vocational track). Within the vocational track, students can acquire a hybrid qualification (Deißinger, Aff, Fuller, & Helms Jørgensen, 2012): The Federal Vocational Baccalaureate, which provides access to tertiary education, can be attained while working or after basic vocational training.

In the Swiss vocational track, more than 230 apprenticeships exist with various demands. The apprenticeships can be grouped into 32 professional fields (Federal Office for Statistics, 2017). The most popular professional field is business and administration. About 21% of the students (women: 30%) who decide to start an apprenticeship choose this field. Professions with the highest amount of apprentices are wholesale and retail (11%; women: 14%), building industry (9%; women: 1%), and nursing and obstetrics (6%; women: 13%). Examples of least chosen professions are technologies of environment protection, music and dramatic arts, and sports (all < 1%).

Students have to choose an apprenticeship in lower secondary education. They explore their interests and competencies, collect information about the apprenticeship system and complete internships. All students get professional support from classroom teachers to find and apply for an apprenticeship in the beginning of ninth grade. Students can ask for help from career counsellors in school or professional centres. Students indicate that their parents are important supporters in their vocational choice processes (Herzog, Neuenschwander, & Wannack, 2006). Parents informally motivate and support their children to find a profession and apply for apprenticeships. According to an analysis of Swiss population statistics (Babel & Laganà, 2016), after ninth grade, 48% of compulsory school graduates entered vocational training in 2012, 23% started gymnasium, and 4% went directly to an upper secondary specialized school. The remaining quarter of students attended a so-called bridge year after the ninth grade, went to work unskilled, repeated a school year, or took part in short-term activities (e.g., stay abroad). Women were more likely to enter gymnasium (27%; men: 20%; Babel & Laganà, 2016), and men were more likely to enter vocational training (57%; women: 38%; Babel & Laganà, 2016). Our analysis focused on students who entered VET after lower secondary education.

2 Method

2.1 Sample

The analyses are based on data from the Swiss longitudinal study “Effects of Tracking”. A class-wise sampling procedure in four Swiss cantons was carried out. The analyses referred to a sample of seventh- and ninth-grade students. The seventh-grade sample consisted of 1,515 students (mean age: 13 years; female: 48.0%). From those students, 698 participated in the study again in the ninth grade (response rate: 44.3%). For the variables that we used in this study, no significant differences existed between those who only participated in the seventh grade and those who participated in the seventh and ninth grades: professional environment of desired profession, $\chi^2(5) = 3.01$, $p > 0.05$, $n = 943$; professional environment of first role model’s profession, $\chi^2(5) = 8.42$, $p > 0.05$, $n = 770$; professional environment of second role model’s profession, $\chi^2(5) = 5.51$, $p > 0.05$, $n = 535$. Because type of professional interest, professional environment of first internship, and professional environment of chosen apprenticeship were surveyed only in ninth-grade classes, between-survey selection effects could not be tested. In this study, we used the data from all 348 students who participated in the study in the seventh and ninth grades and reported that they were working in an apprenticeship ($n = 343$) or were unskilled ($n = 5$) after ninth grade (female: 38%, mean age in ninth grade: 15.9 years).

2.2 Instruments and Variables

The students answered standardized questionnaires in their classrooms (seventh grade: paper and pencil, ninth grade: online). The survey was administered by trained members of the research team in seventh-grade classes and by the teacher in ninth-grade classes. Including instructions, 90 minutes were made available to the participants to fill out the questionnaires. After 45 minutes, participants had a break of between five and fifteen minutes. Students who did not complete the questionnaire received the opportunity to continue working on it but only at their own request and in consultation with their teacher. Students whose parents had consented to their participation but who were absent did not participate in the seventh-grade survey. In ninth-grade classes, they were asked to fill out the questionnaire at home.

To examine the hypotheses, several constructs were used:

1. Seventh-grade students were asked to write down their desired professions in an open format. If multiple professions were mentioned, the first profession was chosen for the analyses.
2. Seventh-grade students were asked to write down the professions of their two most important role models. Again, if multiple professions were mentioned, the first profession was chosen for the analyses.
3. In ninth-grade classes, we asked for the profession of the first internship in lower secondary school.

4. Students' professional interests were obtained in ninth-grade classes using the Allgemeinen Interessen-Struktur-Test revision (AIST-R) [General Interest Structure Test – revised] developed by Bergmann and Eder (2005). The test measured six factors of interests with five items, based on Holland's (1973) model. All 30 items were measured with a 6-point Likert scale. The six-factor solution of the factor analysis explained 61.6% of the variance. The highest value of the six factors indicated each student's type of interest (Hirschi, 2009; Kirsten, 2007). Table 1 shows the statistics for the six factors of professional interest.

Table 1: Six Factors of Professional Interest

Factor	N	M	SD	α
<i>Realistic</i>	2220	2.45	0.98	0.76
<i>Investigative</i>	2207	2.54	0.99	0.81
<i>Artistic</i>	2203	2.61	0.92	0.73
<i>Social</i>	2217	2.84	1.07	0.82
<i>Enterprising</i>	2200	2.71	0.96	0.79
<i>Conventional</i>	2169	2.36	0.91	0.82

Note. *M*: mean, *SD*: standard deviation, α : Cronbach's Alpha

5. At the end of ninth grade, the teachers were asked to indicate the post-compulsory education of each of their students. The students were asked to write down their post-compulsory education in their survey, as well. Students' chosen apprenticeships after ninth grade was derived from the information provided by the teachers. If the teacher's information was missing, the student's information was used. The teachers typically know well what transition their students will realise.

All professions (desired profession, profession of chosen apprenticeship, professions of two role models, profession of first internship) were categorized. Professions were first coded according to the profession database provided by the Federal Statistical Office of Switzerland (FSO code). Then, according to these FSO codes, professions were categorized into professional environments using the profession register provided by EXPLORIX (Jörin, Stoll, Bergmann, & Eder, 2003). This profession register is based on Holland's RIASEC coding system. Professions that did not have a code in EXPLORIX were coded by two trained raters, who assigned three RIASEC letters to the FSO codes (consent-based). The categorization of similar professions by EXPLORIX was used as a point of reference in the manual assignment process. Although three letters of the RIASEC coding system were assigned to each FSO code, following the common theoretical strategy (Nauta, 2010), only the first letter of the RIASEC coding system was used to categorize the professions into professional environments.

The realization of the desired professional environment was operationalized as a dummy coded variable by matching the professional environment of the desired profession with

the professional environment of the chosen apprenticeship (0 = no match; 1 = match, no response: 20.4%). It serves as the dependent variable in logistic regression analyses. To conduct the logistic regression analyses, all independent variables were also coded as dummy variables: (a) The professional interest was operationalized by matching the professional interest type with the professional environment of the chosen apprenticeship (0 = no match, 1 = match; no response: 19.8%). (b) The role model's influence on realization of the desired professional environment was measured by matching the professional environments of the two most important role models' professions with the professional environment of the student's chosen apprenticeship (0 = no match, 1 = match). In the case of a match, at least one of the professional environments of the role model's profession had to correspond with the professional environment of the student's chosen apprenticeship (no response: 35.6%). (c) The first internship's influence was measured by matching the professional environment of the first internship's profession with the professional environment of the chosen apprenticeship (0 = no match, 1 = match; no response: 9.2%).

3 Results

3.1 Descriptors

In the Swiss apprenticeship system, the number of professions per professional environment varied between the six RIASEC codes (R: 65.4%, I: 1.8%, A: 10.1%, S: 7.8%, E: 4.6%, C: 10.1%). In 2006, the ratio between the six RIASEC types in all available apprenticeships was similar, but slightly more available apprenticeships were in the conventional environment (R: 53.6%, I: 0.9%, A: 5.1%, S: 10.6%, E: 3.1%, C: 26.8%; Hirschi, 2009). We first present the frequencies of the types of desired professional environments in seventh-grade responses in combination with the chosen professional environments after ninth grade (Table 2). Students with professional desires in realistic, social, and conventional professional environments often realized their desired professional environments in their apprenticeships after ninth grade (R: 74.8%, S: 53.1%, C: 50.0%). However, the students' chosen professional environments changed after ninth grade, when they desired a profession in the investigative, artistic, or enterprising field in seventh grade because of rare opportunities. They often changed to a realistic or conventional type of professional environment when they started their apprenticeships. Overall, most of the chosen apprenticeships were located in realistic and conventional professional environments (R: 51.8%, C: 39.3%).

Table 2: Correspondences between Types of Professional Environments of Desired and Chosen Apprenticeship after 9th Grade

		Chosen apprenticeship after 9th grade						sum
		R	I	A	S	E	C	
Career desire in seventh grade	R	98 74.8%	0	2	5	1	25	131
	I	7 77.8%	0 0.0%	0	0	0	2	9
	A	13 39.2%	0	3 9.1%	6	0	11	33
	S	8 16.3%	0	3	26 53.1%	0	12	49
	E	10 37.0%	0	0	2	3 11.1%	12	27
	C	11 39.3%	0	1	1	1	14 50.0%	28
	n.a.	28 45.9%	1	1	6	2	23	61
sum	175 51.8%	1 0.3%	10 3.0%	46 13.6%	7 2.1%	99 39.3%	338 100%	

Note. R: Realistic, I: Investigative, A: Artistic, S: Social, E: Enterprising, C: Conventional, n.a.: missing value, Frequencies and percentages, $\chi^2 = 148.6$, $df = 36$, $p < .001$;

We now present the frequencies of the role models mentioned as first or second entries in the seventh-grade survey. Among the 348 seventh- and ninth-grade students who participated in the study and reported that they were working (apprenticeship or unskilled work) after ninth grade, 261 (75%) named at least one professional role model (Table 3). The persons are presented for the first and second role model and in total. The table shows that students' fathers are the most common role model for most of the students. "Mother" and "male famous/public person" were mentioned second and third as primary role models. Along with "father," "mother," "male famous/public person," and "other male person," "uncle" and "aunt" were named relatively often as second role models. Overall, about 39% of the students listed their father or mother as their primary or secondary role model. In 32% of the cases, other male or female relatives were indicated as role models. These results are consistent with other studies in this field, which report that parents and relatives are mentioned the most as role models (Makarova & Herzog, 2014; Maschetzke, 2009; Zinnecker, et al., 2003; Zinnecker & Silbereisen, 1996). Famous public persons (9%) were rarely mentioned. Table 3 illustrates the types of persons that serve as students' role models.

Table 3: First and Second Role Model

Role model	first entry		second entry		total	
	N	%	N	%	N	%
Father	90	34.9	29	14.8	119	26.2
Mother	32	12.4	26	13.3	58	12.8
Famous/public person	22	8.5	20	10.2	42	9.3
Other male person	16	6.2	22	11.2	38	8.4
Friend/colleague	13	5	5	2.6	18	4
Brother	12	4.7	8	4.1	20	4.4
Male cousin	11	4.3	5	2.6	16	3.5
Female cousin	10	3.9	8	4.1	18	4
Uncle	10	3.9	12	6.1	22	4.8
Other female person	10	3.9	8	4.1	18	4
Other male relative	8	3.1	9	4.6	17	3.7
Sister	7	2.7	6	3.1	13	2.9
Godmother or godfather	7	2.7	10	5.1	17	3.7
Other female relative	5	1.9	7	3.6	12	2.6
Aunt	4	1.6	13	6.6	17	3.7
Grandmother or grandfather	1	0.4	8	4.1	9	2
Total	258	100	196	100	454	100

Note. Frequencies and Totals. father = father or stepfather or spouse of mother; mother = mother or stepmother or spouse of father; friend/colleague = friend/colleague or friend/colleague of parents or friend/spouse of sibling

3.2 Correspondences

To receive more reliable values to test the hypotheses, missing data were imputed 20 times using the multiple imputation procedure in SPSS (Graham, 2009). Results in Table 4 and Table 5 were calculated using the imputed data.

Correspondences of professional environments between various professional variables were analysed (Table 4). The correspondence between the desired professional environment and the chosen apprenticeship's environment is quite high (53.2%). This result indicates that the RIASEC codes of the desired and chosen professional environments corresponded in 53.2% of the cases. The frequency of persons whose RIASEC codes match between the desired and the chosen professional environments was significantly higher than that of the persons whose RIASEC codes do not match. The results show

that the desired professional environment corresponds with the type of professional interest in 46% of the cases (Hypothesis 1a), with the professional environment of at least one of the role models' professions in 69% of the cases (Hypothesis 2a) and with the professional environment of the first internship's profession in 56% of the cases (Hypothesis 3a). The professional environment of the chosen apprenticeship corresponds with the type of professional interest in 53% of the cases (Hypothesis 1b), with the professional environment of at least one of the role models' professions in 53% of the cases (Hypothesis 2b) and with the professional environment of the first internship's profession in 76% of the cases (Hypothesis 3b).

Table 4: Correspondences Between Professional Environments and Types of Professional Interest in Seventh and Ninth grades

	2	3	4	5
1 Desired profession (7 th grade)	185 53.2%	241 69.3%	194 55.7%	159 45.7%
2 Chosen apprenticeship (9 th grade)		183 52.6%	265 76.1%	186 53.4%
3 Role models' professions (7 th grade)			184 52.9%	166 47.7%
4 Profession of first internship (9 th grade)				178 51.1%
5 Type of professional interest (9 th grade)				

Note. N total per field = 348. Frequencies and Percentages. For all match pairs, the frequencies between matching and non-matching RIASEC codes differ significantly:
 $p < .001$.

3.3 Prediction of the Realized Transition

Stepwise logistic regression analyses with Mplus were conducted to predict the probability of match of the RIASEC code between the desired professional environment and the chosen professional environment (Table 5), and gender effects were controlled. The effect of professional interest is significant (Model 3). The effect is reduced after inclusion of the role model's profession (Model 4). All three independent variables significantly predicted the probability that the professional environment of the professional desire would be realized in the chosen apprenticeship (Model 5; explained variance: 23.2%). The strongest standardized effect (beta = .30, $p < .001$) can be found for the role models' professional

environments (H2c) (type of professional interest: $\beta = .15$, $p < .001$ [Hypothesis 1c], professional environment of first internship: $\beta = .20$, $p < .001$ [Hypothesis 3c]) after controlling for gender. Therefore, all three hypotheses regarding the realization of the desired professional environment in the apprenticeship after ninth grade (Hypothesis 1c, Hypothesis 2c, and Hypothesis 3c) were confirmed.

Table 5: Prediction of Realization of the Desired Professional Environment in Upper Secondary Apprenticeship: Stepwise Logistic Regression Analyses, Standardized Coefficients

predictor	Model 1	Model 2	Model 3	Model 4	Model 5
Type of professional interest			.24***	.19**	.15*
Role models' professions		.35***		.32***	.30***
Profession of first internship	.28***				.20**
Gender	.11	.14*	.14*	.11	.07
N	348	348	348	348	348
AIC	473	451	478	437	423
R^2	10.5%	15.8%	9.1%	19.6%	23.2%

Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, $N = 348$

4 Discussion

The aim of the study was to explain how students choose professional environments at the end of lower secondary education. Our data show that a significant and high correspondence exists between role models' professional environments and the desired (69%) and chosen (53%) professional environments (Hypotheses 2a and 2b confirmed). The same holds for the correspondence between the professional environment of the first internship with the desired (56%) and the chosen (76%) professional environments (Hypotheses 3a and 3b confirmed). In both cases, the correspondences tended to be higher than the correspondences between a person's type of interest and the desired (46%) and the chosen (53%) professional environments (Hypotheses 1a and 1b confirmed). In line with the model of Lent et al. (1994), the results show that the person's type of interest (Hypothesis 1c confirmed), professional environments of role models (Hypothesis 2c confirmed) and the professional environment of the first internship (Hypothesis 3c confirmed) predicted the probability that the desired professional environment of seventh-grade students corresponds with the chosen professional environment in apprenticeship two years later. Although a person's type of interest has an independent effect on the realization of the desired professional environment, it is partly mediated by the role models' professional environments and the professional environments of the first internships. Because several studies investigated the importance of interests (Tarnai & Hartmann,

2015), little research shows the substantial effect of role models and internships within the career choice process although it is assumed in theory (Lent et al., 1994). The social cognitive career theory (Lent et al., 1994) is suitable for explaining this process and allows for prediction of the professional environments that students choose.

It was possible to adapt the model that Lent et al. (1994) developed in the U.S. context for the case of Switzerland. Prior research examined more aspects of the model in various countries (Lent et al., 2018). With small adaptations, the model can be applied to several education systems. The results stress the importance of students' direct and indirect experiences in work environments for career decisions (Bandura, 1977). Students choose an internship in a professional environment where they learn new activities and get feedback about their competences and values. Those concrete experiences influence students' professional goals and expectations. If students get positive feedback and start an apprenticeship in the same professional environment, they have a high probability of realizing their desired professional environment. Additionally, role models offer indirect professional experiences. They offer concrete insight about professional activities. Parents are the most frequently chosen role models (39% of the cases). If role models present a positive view of their professional environments, students tend to choose an apprenticeship in those professional environments. Results indicate that the correspondence between the role models' professions and the chosen apprenticeships predict the probability that students realize the desired professional environments in their apprenticeships.

4.1 Limitations

The study has several limitations. The professions were coded by the RIASEC system, which represents broad professional fields and not specific professions. The correspondences between desired profession, chosen apprenticeship, role model's profession, and internship's profession are lower when analysed on a more specific level. Coding every single profession would have over-specified the empirical model. Then, a person's type of interest and internship professions were measured in ninth grade whereas role models' professions were measured in seventh grade. The type of interest, the internship profession and the chosen apprenticeship are measured in a narrower time range than the professions of the role models and the desired apprenticeship, which is why the correspondence between type of interest and profession of the chosen apprenticeship could be enhanced. We used the type of interest as a control variable to evaluate the prediction of role models' professions and internship profession. The strengths of the effects of interest type, role models' profession, and internship profession cannot be directly compared with each other.

Future research should examine, following the model of Lent et al. (1994), how role models and internships affect students' career choice processes in various countries. Such research would show how educational system structures interact with individual career choice processes.

4.2 Practical Implications

The results have implications in two perspectives: professional counselling and education. The results may help career counsellors shape their counselling methods by allowing them to take a closer look at students' role models and consider practical experiences. Counsellors should include the role models' professions and how they correspond with the client's interests and desired profession. For example, counsellors could ask students about their role models' professions and how they correspond with their interests. This contextual view is in line with recent career counselling theory (Savickas, 2012). Then counsellors should encourage students to explore their desired professions in internships. The activities in companies give a concrete picture of the professions, and students receive positive or negative feedback. This feedback helps them choose a profession in an apprenticeship or find a new, better-fitting profession. This approach encourages counsellors not only to focus on students' interests but also to include direct and indirect student experiences.

Moreover, persons who are role models for students should be aware of their responsibilities in presenting their professional experiences. Role models are responsible for reflecting their goals and how they influence students' career choice processes. Our results show that parents and relatives are the most common role models. Parents should be aware of their predestined function as professional role models and consider how they influence their offspring's career choice process, including the possibility of limiting their influence and letting students make their self-determined career decisions independent of the parents' wishes. Therefore, the role model function includes helping students form their educational perspectives, and educational players promote and hinder students' career choice processes.

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“The Force that Keeps you Going”: Enthusiasm in Vocational Education and Training (VET) Teachers’ Work

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Abstract

Context: Enthusiasm has been noted to increase productivity and quality at work. In teachers’ work, this has a connection to student learning and motivation, as well as teaching quality. In the context of Finnish vocational education and training (VET), research on enthusiasm appears especially topical and relevant because of the ongoing wide reform with emphasis on productivity and efficiency.

Approach: In this study, Finnish VET teachers’ enthusiasm at work was studied qualitatively. Three research questions were set for this study: (1) How do VET teachers describe their enthusiasm?; (2) What factors strengthen their enthusiasm, according to their descriptions?; and (3) What factors weaken their enthusiasm, according to their descriptions? Altogether, 103 teachers who voluntarily participated in the study completed an online questionnaire on enthusiasm. The data were analyzed through qualitative content analysis.

Findings: According to the results, the teachers who participated in the study were very interested in their work. They wanted to share how they experienced enthusiasm in their work. Their enthusiasm manifested as their willingness to develop their skills and expertise. It also showed in their dedication, good job performance, and positive feelings about their work. Student encounters, a positive atmosphere, and work interactions were the main sources of enthusiasm. Lack of resources, changes, cuts in the VET budget, and a lousy work atmosphere weakened enthusiasm.

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Conclusions: The study found that enthusiasm manifested itself in ways that correspond well with the current VET productivity and efficiency goals. Because enthusiasm was strengthened especially when teachers were working with students, it seems important to ensure a supportive work environment for students also after the VET reform. Positive interactions, collegial support, and working together can help teachers to succeed and to maintain enthusiasm in their everyday work. According to the results of this study, supervisors may play a central role in facilitating teacher enthusiasm.

Keywords: VET, Vocational Education and Training, Teacher, Enthusiasm, Work Engagement, Vocational Education

1 Introduction

The speed of the changes in the workplace presents unprecedented challenges for vocational education and training (VET) currently. This naturally concerns VET teachers, too. The central task of vocational education is to produce workers with high levels of expertise and to support life-long learning and professional growth (Law on vocational education 531/2017, 2 §). Today's employees cannot expect to just keep doing the same tasks and to stay in the same job for decades. These demands influence VET teachers' work greatly – from the way they perceive their job and its changing nature and the way they prepare students for the workplace. Enthusiastic experts are needed in today's workplaces (e.g., Zhu & Engels, 2014), which is one the goals that the reform of Finnish vocational upper secondary education is going to respond. Where is enthusiasm found in teachers' work?

Enthusiasm is one of the factors in work engagement, or it can be merely a form of work engagement (Hakanen, Bakker, & Schaufeli, 2006). Kunter and Holzberg (2014) has defined engagement as positive affective motivational fulfillment, which includes the aspect of enthusiasm. Enthusiasm is a personal experience of feeling energetic and inspired at work (Barsade & Gibson, 2007; Russell, 1980; Warr, 1990). The manifestation of enthusiasm has been described as “conjoined occurrence of positive affective experiences” and “enjoyment” (see e.g., Keller, Woolfolk Hoy, Goetz, & Frenzel, 2016, p. 751). The term “employee engagement refers to the individual's involvement and satisfaction with as well as enthusiasm for work” (Harter, Schmidt, & Hayes, 2002, p. 269). In general, enthusiasm is often linked to engagement, which in turn has been noted to have a positive influence on, for example, productivity in organizations (Harter et al., 2002; Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2009b) and personnel well-being (Hallberg & Schaufeli, 2006; Schaufeli, Taris, & Van Rhenen, 2008; Uusiautti & Määttä, 2015).

The effects of enthusiasm have been studied in the work of teachers at various education levels (e.g., Keller et al., 2014; Kunter et al., 2013; Patrick, Hisley, & Kempler, 2000). In sum, teacher enthusiasm has a positive influence on student learning, performance, and motivation (Keller, Neumann, & Fisher, 2013; Kunter et al., 2013; Patrick et al., 2000), and on teaching quality (Frenzel, Goetz, Lüdtke, Pekrun, & Sutton, 2009; Kunter et al., 2011; 2013). An enthusiastic teacher promotes enthusiasm in students (Frenzel, 2008; Frenzel et al., 2009).

The most extensive reform of vocational education (later referred as the reform) is currently taking place in Finland as degree requirements, legislation, and funding systems are being overhauled (Minedu, 2017). This reform updates the entire vocational education and training (VET) by 2018. As part of this reform, the funding provided for vocational education units will be dependent on student graduation rates, employment success, and post-secondary education – in other words, education effectiveness. At the same time, the workplace needs enthusiastic employees who are willing to develop the job and their own expertise (see e.g., Uusiautti, 2017). Due to the comprehensive reform in the Finnish vocational education, the findings from the aforementioned studies seem promising from the perspective of vocational education: enthusiastic teachers can boost students' enthusiasm about the field they are studying and about their future occupation. Considering these demands on VET teachers' work, we found it reasonable to examine how they describe their enthusiasm and to determine what could be learned from their experiences.

The purpose of this research was to analyze VET teachers' enthusiasm at work and the factors influencing it, based on their own perceptions. Therefore, the purpose was to “learn” from teachers' subjective experiences and to hear their voices to make conclusions about, for example, how to help them to maintain their enthusiasm, instead of just analyzing enthusiasm at the levels of behaviors or teaching styles (see Kunter et al., 2011).

2 Theoretical Background

Teacher enthusiasm has been studied in the form of *displayed enthusiasm* and as *experienced enthusiasm* (Keller et al., 2016). Expressed enthusiasm refers to teachers' interactions and teaching styles as well as to non-verbal communication and presentation in teaching situations (Keller et al., 2016). Experienced enthusiasm means being inspired about the subject one is teaching and being inspired about teaching in general (Keller et al., 2016).

Teacher enthusiasm has been described as an emotional orientation to work that appears in teaching situations and is based on the experienced sense of joy and pleasure in teaching or the subject area (Kunter et al., 2011). However, the concept of enthusiasm seems to need further specification and analysis (Keller et al., 2016). As mentioned, in this study, enthusiasm is regarded as an aspect of work engagement, which includes both emotional and cognitive dimensions (Bakker, 2011; Keller et al., 2016; Schaufeli, Salanova, González-Romá, & Bakker, 2002).

Work engagement can be defined as a wide-spread positive state that does not focus on just one thing, event, or behavior (Schaufeli, & Bakker, 2004), such as a school subject or teaching situation. This perspective is crucial to this study because VET teachers' work is not limited to teaching student groups in classrooms. Instead, vocational education reform in Finland necessitates that VET teachers' work increasingly involve serving as guides and supporters of VET students and their learning processes. Teachers have to work in multi-professional networks, in collaboration with workplaces, and as developers of their own vocational fields and pedagogy (Vähäsantanen, 2015; Vähäsantanen, Saari-

nen, & Eteläpelto, 2010). Furthermore, teachers work as members of their educational institutions, and this also influences their enthusiasm levels (Keller et al., 2016).

The factors that influence and the means to increase teacher enthusiasm have not received much attention (Keller et al., 2014; 2016). This study adds a new perspective by analyzing teacher enthusiasm as a part of work engagement (Bakker & Demerouti, 2007; Demerouti, Bakker, Nachreiner, & Schaufeli, 2001). Even though teachers' resources have been studied (Hakanen et al., 2006), their enthusiasm as an aspect of the definition of work engagement has not been previously analyzed.

This kind of research is important also because previous studies on enthusiasm and work engagement have used mostly quantitative methodological approaches; thus, analyses have focused on pre-determined variables (Bakker & Bal, 2010; Hakanen et al., 2006; Salanova, Bakker, & Llorens, 2006). Therefore, the purpose of this study is to obtain essential information about teacher enthusiasm through teachers' own definitions of this element of work engagement (Creswell & Miller, 2000; Josephson & Vingård, 2007; Keller et al., 2016).

Furthermore, this study is targeted specifically at VET teachers, who have been a less-studied group in research on teachers and on work engagement (see e.g., Bakker et al., 2007; Hakanen et al., 2006; Kunter et al. 2008; 2011). This study is also very topical because it was conducted at the threshold of Finnish VET reform (data collection in 2016-2017; legislation reforms came into effect Jan 1, 2018).

3 Methods

The purpose of this research was to study Finnish VET teachers' enthusiasm at work and to understand the factors that strengthened or weakened their enthusiasm by listening to their voices. The following are the research questions for this study:

- How do VET teachers describe their enthusiasm?
- What factors strengthen their enthusiasm, according to their descriptions?
- What factors weaken their enthusiasm, according to their descriptions?

This was a qualitative study (Lichtman, 2013; Thomas, 2006) aimed at gaining a description and a deeper understanding of the phenomenon under study (Lichtman, 2013). The phenomenon of enthusiasm was described by the teachers themselves; therefore, the emphasis was on discovering their viewpoints and perceptions (Cozby & Bates, 2012; Denzin & Lincoln, 2003; Keller et al., 2016). Qualitative research gives voice to research participants and tries to describe and to interpret phenomena that cannot be directly observed (Cohen, Manion, & Morrison, 2011). The fundamental idea is that the social reality is always complex, multi-layered, and contradictory (Cohen et al., 2011). From the perspective of work and organizations, qualitative research increases our understanding about how people think, feel, and behave at work. This was useful for facilitating and studying employee motivation, well-being, and organizational change and development (Doldor, Silvester, & Atewologun, 2017).

This was a data-driven study, which means that the theoretical information facilitated the analysis and structuring of the findings, but it was not used for categorizing the concepts prior to the analysis. This kind of approach is relevant especially if there is little or no information about the topic under investigation.

The research participants comprised 103 Finnish VET teachers. The data were obtained in two phases – in May 2016 and November 2016–March 2017 through an electronic questionnaire by using *convenience sampling* (Patton, 2002). The internet link for the questionnaire was disseminated to suitable research participants through various networks and social media. First, the questionnaire was sent to vocational education teachers (N=40) through the vocational education development network, in which the author of this article was involved. The teachers were asked to forward the questionnaire to other VET teachers. In addition, the questionnaire was submitted to the members of the Finnish VET teacher organization through social media. In all, there are about 10,000 VET teachers in Finland, but everyone is not a member of a union. By the deadline, 103 teachers had participated in the questionnaire. Of this number, 72 (70 %) were women and 31 (30 %) were men. They represented various age groups, but a majority were between 40 and 59 years old. A majority (N=96; 93 %) had a higher education degree. In sum, they were representative of the basic target group of Finnish VET teachers by gender, age, and education (see Penttinen & Portin, 2017).

The electronic questionnaire included questions about their backgrounds and about enthusiasm that were relevant to the research questions for this study. The first questions estimated how the VET teachers would evaluate their level of enthusiasm at work. For example, they were asked to evaluate how enthusiastic they were about their work with the Likert-scale of 1 to 4 (1=not at all enthusiastic ... 4=very enthusiastic). They were then asked to describe, in their own words, their perceptions of how enthusiasm was manifested (if at all) in their work. In addition, we wanted the teachers to describe the factors that increased and decreased enthusiasm. They were asked open-ended questions about the ways that enthusiasm was manifested in their work, the factors that increased their enthusiasm, and the factors that decreased it. There was no limit on the length of the answers, so the teachers could write freely.

The analysis followed the principles of qualitative content analysis as the data were summarized, conceptualized, and re-structured. This was followed by the creation of various categorizations and classifications (Basit, 2003; Hsieh & Shannon, 2005; Morse & Richards, 2003; Thomas, 2006). The data analysis was performed by using Excel to distribute the answers to each question into units of analysis and relevant categories (Basit, 2003; Thomas, 2006). Reduction was achieved by first omitting irrelevant content from the teachers' answers (Thomas, 2006). For example, "collaboration with teachers from various fields in the institution, collaboration with teachers of various subject" was reduced to "collaboration and work community." In the second phase, grouping, the reduced expressions were compared and regrouped based on the similarities and differences (Hsieh & Shannon, 2005; Morse & Richards, 2003; Patton, 2002). In the third phase, sub-categories were combined to create main categories. This was followed by abstraction, as the actual main result categories had been created (Hsieh & Shannon, 2005; Morse & Richards, 2003; Patton, 2002). The main categories are introduced in the Results section.

When evaluating the data collection and quality of research, some factors are worth noting. The data were collected in two phases. This presumably evened out the changes that occurred in the teachers' enthusiasm levels during each study year. This can be considered as increasing the reliability of the study (Cohen et al., 2011; Francis et al., 2010). In addition, approaching teachers through multiple channels – open networks, organizations' intra networks, social media, and unions – might have strengthened reliability because this ensured that teachers from various VET institutions and teachers from around the country could participate in the study.

As a method, an electronic questionnaire makes the collection of even large amounts of data quick and efficient (Cohen et al., 2011). Electronic data are also easy to manage and analyze. However, this method has been criticized for its superficiality (Creswell & Miller, 2000).

In this study, the open-ended questions were answered with mostly lengthy descriptions. Yet, some answers were only one word long, such as “supervisor” or “colleagues,” resulting in a lack of in-depth information from the specific answers. From the perspective of this study, it was important to obtain information in the teachers' own words, and it was also important that the group of participants be large because the purpose was to understand and to conceptualize the phenomenon (Cohen et al., 2011; Cozby & Bates, 2012; Hsieh & Shannon, 2005). Naturally, the electronic questionnaire did not allow the researcher to observe these teachers' actual teaching and interaction styles; the researcher could only interpret the teachers' own descriptions of their actions in teaching situations. In addition, questionnaire research is challenging because people may interpret the questions differently (Cohen et al., 2011; Cozby & Bates, 2012). When answering questions about how enthusiasm was manifested, the participants sometimes also described the outcomes of their enthusiasm. While this difference is not crucial from a practical perspective, connections between reasons and outcomes have to be defined and studied through carefully chosen methods and research designs (Kunter et al., 2008).

In this study, VET teacher enthusiasm was studied qualitatively through the teachers' own words (Cozby & Bates, 2012). The participants were able to complete the questionnaire anonymously; therefore, they could trust that they would not be recognized by their answers. This meant that the participants could also provide even comments that were critical about their workplaces and work environments freely (see also Cohen et al., 2011). Still, it is relevant to discuss whether these teachers' descriptions provide information about the reality in their work units or in student encounters and whether students or colleagues perceived these teachers' enthusiasm in the same manner that the teachers described it (Keller et al., 2016). In sum, this research approach depends on the accuracy and relevance of participants' descriptions (Creswell & Miller, 2000; Gagné & Vansteenkiste, 2013).

4 Results

4.1 The Manifestation of Enthusiasm

A majority of the VET teachers (N=93; 90%) reported that they were very or quite enthusiastic about their work. Only ten participants felt that their enthusiasm was minimal or missing. In all, the research participants expressed in many ways how their enthusiasm was manifested: willingness to develop their job and expertise, dedication to the job, good job performance, and positive emotions and well-being.

First, enthusiasm was manifested by the willingness to develop teaching and guidance skills to better meet students' individual needs. In addition, enthusiasm seemed to increase the desire to educate and to try new methods.

“I think all the time, how I could teach better, more clearly, and more concretely everything.” (5)

“After this long career, I still do not perceive myself as stuck, but I always find energy to get excited about new ways of working.” (25)

Enthusiasm also appeared as effort and dedication at work. This led to better performance, according to the VET teachers' descriptions.

“So you are not satisfied with the barely good enough, but you want to challenge yourself and your closest colleagues to do your best 100 %” (1)

Effort and dedication also meant that teachers followed developments in their fields closely and wanted to use the newest research-based information and teaching methods. Enthusiasm appeared as aspiration to design and to implement teaching techniques in versatile and inspiring ways so that students would be encouraged and motivated.

“Even during free time, I (even unconsciously) plan future encounters with students and forthcoming courses, take notes [about ideas].” (37)

Enthusiasm manifested as positive emotions and joy at work. The VET teachers had viewed enthusiasm as a good mood, joyfulness, positivity, and enjoyment on the job. These positive states could last beyond the workday; therefore, enthusiasm was also considered to affect overall well-being as it extended to other areas of life. According to the VET teachers, considering their work meaningful and valuable increased their positive perception of work.

“[Twenty-three] 23 years and yet it has not felt like work. Every morning I want to go to school.” (68)

“[It is] the force that keeps you going.” (29)

4.2 Factors Strengthening Enthusiasm

The VET teachers named several factors that increased their enthusiasm most. These included students, a good atmosphere and positive interactions in the workplace, resources related to the content and the nature of the job, professional development opportunities, and success and positive feedback from others.

The most important source of enthusiasm at work was students and interactions with them. The VET teachers reported that they especially felt excited when seeing students learn and succeed. These events meant that they had succeeded in their work. Thus, students' enthusiasm, activity, and motivation were considered to increase teachers' own enthusiasm.

“When I see a student learn and comprehend things (especially something he or she has found difficult or repulsive). In other words, when I feel that I have succeeded in my work!” (12)

“Teaching is nice, and I notice that my enthusiasm has partly spread to students. I have also received direct feedback about it.” (46)

Positive interactions and work atmosphere were considered crucial for enthusiasm. Interactions with colleagues and between supervisors and employees should be positive. According to the VET teachers' perceptions, their enthusiasm became stronger if they had likeminded co-workers or if they received support and encouragement from the work community for their development ideas. Sometimes, inspiring interactions and collaborative relationships can be found through networks, projects, and partnerships with workplace representatives.

“You can express your thoughts safely and are allowed to develop things together with others. Good conversations and that you have regularly time to discuss with your closest co-workers.” (31)

The VET teachers also mentioned that certain factors that were related to the content and nature of their work inspired and maintained enthusiasm. These factors were autonomy, challenges, diversity, and versatility. New tasks, changing work, and digital innovations were regarded as inspiring and providing new opportunities to learn at work. Opportunities to learn on their own or to participate in in-service training to develop their expertise and to apply what they have learned to their work (e.g., in curriculum planning), were mentioned as important for enthusiasm.

“It is challenging to get rusty in this job.” (10)

“The work is appropriately challenging and provides opportunities to learn more all the time.” (29)

“Voluntary studying gives me joy and benefits at work.” (19)

The VET teachers also mentioned experiences of student success and positive feedback from students, colleagues, and supervisors. Personal experiences of their own success

strengthened their belief in themselves as teachers, while positive feedback from others convinced them about the appreciation of their effort and expertise.

“All feedback and encouragement increase trust in your expertise and inspires to carry on.” (52)

4.3 Factors Weakening Enthusiasm

The VET teachers named the following as the main factors threatening their enthusiasm at work: lack of resources and cuts in education spending, negative atmosphere and problems in workplace interactions, structural and functional issues at their institutions, poor supervision and management, students’ challenges and lack of motivation, and lack of personal resources.

The VET teachers reported that teaching resources had become scarcer because of recent cuts in education spending. The number of contact hours had decreased, while class sizes had increased. This made the teachers feel inadequate as they could no longer provide students as much support and guidance as the students needed. In general, being rushed, not having enough time, and having to do more administrative work decreased teachers’ enthusiasm on the job. Changes and cuts in the vocational education budget made teachers feel insecure and uncertain about the future of VET. They were worried about job stability. In addition, the changes seemed to create confusion, especially if the changes had not affected their work directly.

“My enthusiasm is weakened by–lack to time to use for teaching. Huge cutting of contact teaching. To learn a vocation, you need time for practicing and repetition.” (82)

“No one is interested in your opinion [about the changes].” (31)

Whereas good interaction and atmosphere strengthened teaching, it was no surprise that negativity, pessimism, constant complaining, as well as lack of appreciation and positive feedback crushed enthusiasm. Difficulties in interaction and communication and lack of opportunities to share opinions with colleagues were factors that created a negative atmosphere at work.

“Colleagues’ unwillingness and laziness, and indifferent attitude toward students” (16)

“Several other colleagues’ wish to stick to traditional teaching methods.” (63).

Organizational factors, including structure and management (such as hierarchy and rigidity) made the VET teachers lose their enthusiasm. At the worst, organizational factors did not create space for inspiration, learning, and the development of new teaching methods.

“Everybody does it like this’ guidance” (1)

Some VET teachers mentioned that work was poorly organized. Some teachers had deficiencies in their physical work environment (e.g., dull and impractical teaching structures, lack of new technology). Likewise, problems in management and supervision, lack of support, and ignorance were considered to decrease enthusiasm. The VET teachers also mentioned that students had various problems, e.g., life management skills and lack of motivation, that made their work as teachers challenging, especially because of the inadequate amount of time allotted for guiding and supporting students.

“Unmotivated students who do what they want, and come and go randomly. . .”
(60)

5 Discussion

The research participants seemed to be VET teachers who described themselves as being enthusiastic about their work and wanted to talk about it (e.g., Seale, 1999). Of the 103 participants, 93 (90%) described themselves as very or somewhat enthusiastic, while only 10 participants (10%) were just a little or not at all enthusiastic. It must be noted that the findings might have been different if more teachers who were less enthusiastic had participated in the study (Francis et al., 2010). In this kind of research, the participants are usually different from those who choose not to participate (Dale, 2006). The VET teachers' answers were quite similar. All the main result categories covered dozens of teachers' perceptions. The main categories were all accounted for by the first 35 participants.

Next, we summarize the findings of this research at two important levels that emerged from the teachers' answers: (a) enthusiasm as the catalyst for improving teaching effectiveness and (b) positive emotions and social interaction as the foundation for enthusiasm.

5.1 Teachers' Enthusiasm Serves as the Catalyst for Development of Teaching Effectiveness and Positive Emotions at Work

Teachers described their enthusiasm as teaching and interaction styles and as the subjective experience of pleasure (emotional dimension) and enthusiasm about their subject areas and the act of teaching (cognitive dimension) (Keller et al., 2016; Kunter et al., 2011). Enthusiasm manifested itself as the wish and desire to develop their own work, teaching techniques, and expertise, and to participate in the development of their institutions (see also Bakker, 2011; Klusmann et al., 2008). The VET teachers were dedicated and wanted to perform well and efficiently (see also Demerouti, Bakker, & Gevers, 2015), especially in teaching and other encounters with students. According to their descriptions, their enthusiasm led to “extra-role performance,” which meant they were working beyond what was required (Demerouti et al., 2015).

When the VET teachers considered the manifestation of their enthusiasm, they referred to their enthusiastic teaching styles, which appeared to be creativity and pleasure in teaching situations. According to previous studies, (Frenzel et al., 2009; Keller et al.,

2016), students may find this kind of teaching style interesting and inspiring. According to the findings of the current study, teachers experienced enthusiasm especially in encounters and interactions with students. This finding is also supported by those of earlier studies on teacher enthusiasm (Frenzel et al., 2009; Kunter et al., 2011).

In addition, teachers described many experiences of joy and pleasure that were related to teaching situations and work with students (Keller et al., 2014; 2016; Kunter et al., 2008). The VET teachers in this study hoped that their enthusiasm about their field of VET would increase students' enthusiasm and appreciation for their vocations. Indeed, the results of previous studies indicate that enthusiastic VET teachers are important role models (Keller et al., 2016; Krapp, 2007; Long & Woolfolk Hoy, 2006; Patrick et al., 2000; Patrick, Turner, Meyer, & Midgley, 2003). The teachers in this study had noticed that their enthusiasm was captured by the students (see also Bakker, 2011; Hatfield, Cacioppo, & Rapson, 1994). It has been noted that an enthusiastic teacher can create a positive participatory learning atmosphere that may enhance students' motivation and learning (Frenzel et al., 2009; Keller et al., 2016; Kunter et al., 2013; Meyer & Turner, 2006; Patrick et al., 2000; Pekrun, Goetz, Titz, & Perry, 2002). This leads to positive and good learning outcomes because enthusiasm can help students to have the courage to seize new challenges and the confidence to set goals.

Often, positive emotions have been used for explaining the positive effects of enthusiasm (Duckworth, Quinn, & Seligman, 2009; Frenzel, 2008; Frenzel et al., 2009; Pekrun et al., 2002; Zhang, 2014). Indeed, it seems plausible that effort, dedication, good job performance, and the development of the job and the individual's expertise are connected to the positive emotions aroused by enthusiasm (Mroz & Quinn, 2013; Sekerka, Vacharkulksemsuk, & Fredrickson, 2012). In other words, enthusiastic encounters with students and colleagues can engender positive emotions and again increase the likelihood of positive behaviors, such as positive and efficient development and increased work engagement (Klusmann et al., 2008; Long & Woolfolk Hoy, 2006; Uusiautti, Määttä, & Leskisenoja, 2017).

5.2 Teacher Enthusiasm Comes from Positive Social Interactions

This study showed that support in the work community, the quality of interactions, and a positive workplace atmosphere can increase enthusiasm. On the other hand, a negative atmosphere and interactions can decrease enthusiasm if teachers feel that they are not appreciated or being supported (see also Uusiautti & Määttä, 2013). Enthusiastic colleagues inspire one another and accept new developmental ideas (see also Vähäsantanen, 2015). Lack of enthusiasm in the work community and negative attitudes toward developments were reported to weaken teacher enthusiasm. A good atmosphere and positive interactions have been found to increase work engagement (Bakker et al., 2007; Schaufeli, Bakker, & Van Rhenen, 2009), enthusiasm, and vigor (Carmeli, Ben-Hador, Waldman, & Rupp, 2009).

While students' personal difficulties and lack of motivation seemed to decrease teachers' enthusiasm to some extent, the VET teachers still named students as the main source of their enthusiasm (see also Hakanen et al., 2006). Students' and teachers' enthusiasm

had a reciprocal relationship. The VET teachers noticed that their enthusiasm seemed to increase the students' motivation and study engagement, and the students' interest and motivation inspired the teachers. This positive reciprocal effect has also been noted in previous studies (Kunter et al. 2011; Pelletier, Séguin-Lévesque, & Legault, 2002). Enthusiasm seemed to have a communal and process-like nature as other studies have suggested (Bakker & Xanthopoulou, 2009; Zhang, 2014).

As predicted, lack of resources, budget cuts, and uncertainty and worry about the future of VET decreased the perceived enthusiasm in VET teachers. However, even in situations of uncertainty, management and supervision can strengthen enthusiasm (Uusiautti, 2013). As previous studies have shown, leaders or principals can enhance the enthusiasm of subordinates and teachers by providing resources, showing appreciation, encouraging participation, building trust, and allowing autonomy (Carmeli et al., 2009; Pyhältö, Pietarinen, & Soini, 2012; Roth, Assor, Kanat-Maymon, & Kaplan, 2007; Vähäsantanen, 2015) — in other words, providing the optimal workplace environment. Increased autonomy at work is an important factor in teacher enthusiasm (Gagné & Deci, 2005; Roth et al., 2007).

6 Conclusion

In this study, teacher enthusiasm manifested itself in ways that can be assumed to improve the quality of education and well-being in the work community (see also Keller et al., 2016). Although every teacher is responsible for the atmosphere at work, supervisors have the opportunity to facilitate positive interactions and collegial support through the organization of the workplace (Schaufeli & Bakker, 2004). Even though teachers were very enthusiastic, they faced challenges and difficulties. It is easier to cope with these situations and to find solutions if teachers have faith in their expertise and receive support from the work community. Enthusiasm may increase communality and the ability to cope with everyday stressful situations such as challenging student encounters and the insecurity related to changes in the nature of the job (Zembylas & Barker, 2007).

Work, in general, including teaching, is characterized by continual change. If the atmosphere is positive and focused on opportunities for development, reforms can be more easily accomplished (Barker Casa & Milton, 2012; Fredrickson, 2001). It is also important that teachers participate in planning and the realization of the changes in their work (Pyhältö et al., 2012; Vähäsantanen, 2015). Vocational education reform creates new exciting opportunities to develop and to expand teachers' expertise through collaborations and developmental projects (see also Vähäsantanen, 2015). Management's role is to mediate the change so that individual teachers and teams can perceive their work as being as clearly defined, having as much autonomy, and being as inspiring as possible (see also Pyhältö et al., 2012). There are thus many reasons why discussing ways to enhance teacher enthusiasm is important.

When the connection between enthusiasm and work engagement was analyzed, enthusiasm seemed to be specifically a manifestation of a positive work drive and dedication at work. Stairs and Galpin (2013) used the concept "positive engagement" to describe pos-

itive work engagement and attitudes to work from the perspective of well-being. Positive engagement supports and produces well-being. Positive leadership and opportunities to use one's strengths at work support well-being, good job performance, work drive, dedication, and the willingness to develop skills and expertise (Stairs & Galpin, 2013; see also Uusiautti & Määttä, 2015). Enthusiasm can be inspired and maintained through relationships with leadership that are based on trust and appreciation and are focused on teacher autonomy and participation (Carmeli et al., 2009; Pyhältö et al., 2012; Roth et al., 2007; Vähäsantanen, 2015). In the changing VET, teachers will face complicated situations and must solve them together with others. This will require creativity and flexible thinking, which can happen only if enthusiasm and positive emotions prevail at work (Fredrickson, 2001; Fredrickson & Branigan, 2005; Sekerka & Fredrickson, 2013).

Changes in the workplace cannot be predicted or effected. Therefore, leaders and supervisors have an important role as buffers because they can make work at the personal or team level have as much clarity and autonomy as possible (see also Pyhältö et al., 2012). In a positive atmosphere, new opportunities and changes are easier to embrace (Barker Casa & Milton, 2012; Sekerka & Fredrickson, 2013). Moreover, it would be important that teachers participate in planning and executing changes in their work (Pyhältö et al., 2012; Vähäsantanen, 2015). The reforms in vocational education and training can offer teachers opportunities for professional development. Such opportunities seem to be important resources for teachers (see also Bakker & Bal, 2010).

By focusing on resources and strengths, as well as on the mutual understanding about everyone's role in maintaining a positive workplace atmosphere, it is possible to maintain work engagement and enthusiasm even in the face of external demands and pressures for change (Bakker & Demerouti, 2007; Bakker, Demerouti, & Euwema, 2005; Bakker, Hakanen, Demerouti, Xanthopoulou, 2007). Enthusiasm and the related positive emotions and interactions can facilitate the more efficient use of existing resources (Bakker, 2011; Hobfoll, 2002; Sekerka & Fredrickson, 2013; Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2009a). In sum, enthusiasm can become the force that changes the whole organization by strengthening well-being and the ability to embrace the changes (see also Fredrickson, 2001; Sekerka & Fredrickson, 2013) that VET teachers are currently experiencing in their institutions.

This study was conducted in Finland; therefore, the cultural characteristics that may have influenced the results must be considered. It is important to analyze whether the findings would have been different had the study been conducted with VET teachers in the United States, Australia, or Eastern European countries. Enthusiasm as a positive experience is very personal; thus, (Keller et al., 2014) the ways in which it is expressed or interpreted and the factors influencing it can be contextual. For example, Stenlund's (1995) cross-cultural research showed that cultural norms for student behavior and teacher-student relationships regarding work enthusiasm manifested differently in teachers from different countries. Therefore, more research on enthusiasm in different cultures is needed to determine the validity of the construct "enthusiasm" in culturally diverse settings (cf. research on teacher self-efficacy by Klassen et al., 2009). However, these Finnish VET teachers' perceptions and experiences are an example of teachers' self-perception of the factors that enhance and decrease work enthusiasm.

Enthusiasm is the sum of many factors, including teacher personality (Keller et al., 2014). People interpret work resources and demands differently, based on their own values, interests, and motivation (Tadic, Bakker, & Oerlemans, 2013; Vähäsantanen, 2015). According to Kunter et al. (2008), teacher enthusiasm as a personality trait can be defined as a tendency to experience positive affect during teaching. The findings in this study are supported by previous international studies on teacher enthusiasm and work drive. Enthusiasm has been examined in various types of organizations, and the results have shown the positive influence of enthusiasm on productivity (Harter et al., 2002; Xanthopoulou et al., 2009b), customer service quality (Salanova, Agut, & Peiro, 2005), and workplace well-being (Hallberg & Schaufeli, 2006; Schaufeli, Taris, & Van Rhenen, 2008). In sum, there are many reasons to assume that in vocational education institutions, the influence of teacher enthusiasm would be positive and would increase education quality and effectiveness.

7 Future Directions

Studies that combine the perceptions of teachers, students, and work communities could further increase our understanding of enthusiasm in its social framework. As enthusiasm also seemed to be closely connected to supervision and management, it would be important to study leaders' and supervisors' perspectives (see also Bakker, 2011; Stairs & Galpin, 2013). Indeed, the next phase of the current research is a further analysis of the role of positive work environments and supervisors in teacher enthusiasm.

It seems that a development orientation was closely connected with teachers' descriptions of their enthusiasm. Therefore, it would be relevant to compare enthusiasm with related concepts, such as "thriving," that also include the dimension of learning (Spreitzer, Sutcliffe, Dutton, Sonenshein, & Grant, 2005).

More research is also needed on the connection between enthusiasm and workplace well-being and teaching quality (Kunter et al., 2011). In a time of major changes in VET, this theme is very topical. What kinds of processes occur if we assume that enthusiasm increases teaching quality (Frenzel et al., 2009; Keller et al., 2016; Kunter et al., 2008; 2011)? What does teaching quality mean specifically? Thus, it would be worth studying the influence of teacher engagement and enthusiasm on student graduation rates and employment opportunities. These are now measured in VET; therefore, it would be important to study whether the enthusiasm of the employees affects the productivity of VET institutions in the same way it seems to do in other types of organizations (see Harter et al., 2002; Xanthopoulou et al., 2009b).

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Higher Education in Switzerland: Predictors of Becoming Engaged in Higher Vocational or Academic Education – the Role of Workplace Factors

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Abstract

Context: Vocational education and training enables young people to quickly and effectively enter the labour market. To advance their careers and to develop their professional expertise even more, they must then further their education through higher vocational or higher academic education. In this study, we looked at young people at work: What motivates them to move on towards higher education? As they are engaged in their jobs, their work situations will affect their further educational engagement. We hypothesised that individuals will more likely move towards higher education if their workplaces offer learning opportunities and social support. Human capacities, attitudes, and goals at work develop mainly in informal or non-formal learning situations and in their interactions with their teams. We tested the effect of these workplace factors by taking into account additional important predictors of educational pathways, such as sociodemographic factors (social background, nationality, gender) and motivational factors (values).

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Methods: Data stemmed from a multi-cohort longitudinal survey on educational decisions and educational pathways in the German part of Switzerland (BEN), running from 2012 to 2016. The selected sample consisted of 601 working individuals who were not engaged in higher education in 2014. Multinomial logistic regressions were run to test the hypothesis.

Findings: First, we found that only 35% of the individuals who wanted to become engaged in higher vocational education in 2012 became engaged up to 2016 compared with those intending to become involved in higher academic education, where the rate varied by age—from younger to older—between 45% and 70%. Second, we found distinctive predictors for becoming engaged in higher vocational or academic education. Workplace factors predict engagement in higher vocational education but not sociodemographic factors, whereas sociodemographic and not workplace factors predict engagement in higher academic education. A significant predictor for both groups is the value attributed to higher education.

Conclusions: The unique contribution of this paper is to show that distinct patterns of becoming engaged in higher vocational or higher academic education exist. These results confirmed the persistent effect of sociodemographic factors that shape the pathway to higher academic education. Moreover, the results indicated that an individual's value and workplace factors contribute to enabling paths to higher vocational education, as this depends not on sociodemographic factors but on shaping the work environment that supports learning at work.

Keywords: VET, Vocational Education and Training, Lifelong Career, Professional Development, Learning Culture, Social Inequality

1 Introduction

Further education and training is important for individuals as well as for companies and society (Noe, Clarke, & Klein, 2014), and it is an essential aspect of developing a meaningful work career (Duffy, Blustein, Diemer, & Autin, 2016). Although vocational education and training enables young people to quickly and effectively enter the labour market, a drawback of this early specialisation is the reduced adaptability to changing occupational environments later (Hampf & Woessmann, 2016). Completing further education after completing initial vocational education and training is therefore important, as this helps an individual to advance his or her career, gain access to employment, and sustain and develop the skills needed for innovation and sustainability in a changing and competitive labour market. After graduating from vocational education, not all individuals pursue further education. Engagement in further education during a person's early professional career depends on a multitude of factors. Sometimes further education is seen as being concurrent with productive work. It is the organisational learning culture that enables incidental and non-formal learning at work (Marsick & Watkins, 2003), which also paves the way for formal education. Learning at work contributes to an individual's achievement and performance as well as to his or her future development

(Janssens, Smet, Onghena, & Kyndt, 2017), as the boundaries between these modes of learning overlap (Manuti, Pastore, Scardigno, Giancaspro, & Morciano, 2015).

Individual planning for further education depends on more than merely organisational factors, such as the learning opportunities available at work. Rather, planning also depends on educational opportunities within a specific educational system, as well as on the social expectations and the particular context as reflected by an individual's origin, nationality, or gender (Becker, 2016). Furthermore, planning also depends on an individual's motivation to pursue higher education¹ (Neuenschwander, Gerber, Frank, & Rottermann, 2012; Wigfield, Rosenzweig, & Eccles, 2017).

Irrespective of the question of the educational system, the underlying question is, why do some individuals continue their tertiary education on the vocational pathway whereas others choose the academic pathway? Knowing why individuals follow either the vocational or the academic track to higher education helps companies and counsellors to better advise and coach individuals and to develop measures for upskilling and retaining their workforces by allocating them to higher vocational education.

2 Predicting Participation in Higher Education

Here, we discuss how workplace-related factors, sociodemographic factors, and an individual's value towards further education shapes becoming engaged in higher vocational or higher academic education.

2.1 Workplace Factors

The effects of the workplace on becoming engaged in formal education is complex (Vanthournout, Kyndt, Gijbels, & Van den Bossche, 2015). Workplace factors affect an individual's personality, identity, and goals (Parker, 2014) and can offer opportunities for growth and positive development. This eventually leads to a more self-directed orientation, autonomy, and openness to experiences (Frese, Garst, & Fay, 2007), including an orientation towards higher education. Overall, workplace learning has the power to expand human capacities (Evans, Guile, & Harris, 2011).

The organisational learning culture is the background against which learning in a company is organised (Janssens et al., 2017; Kyndt & Baert, 2013; Messmann & Mulder, 2015) and whether the job design enables learning (Hackman & Oldham, 1975; Raemdonck, Gijbels, & van Groen, 2014). Work offers incidental, informal, non-formal, or formal learning opportunities that should be seen as interacting modes of learning and not as discrete entities (La Belle, 1982). A company's learning culture and an individual's ability to pro-actively take advantage of planned and emerging learning opportunities (Billett, 2004; Illeris, 2003) help the individual to develop the knowledge and skills needed

¹Higher education on the tertiary level is divided into higher vocational education and higher academic education in Switzerland. See chapter on higher education in Switzerland in this paper.

to perform his or her job, and they also motivate individuals to develop future perspectives with respect to their competence development and educational plans (Janssens et al., 2017; Kraiger, Ford, & Salas, 1993). Positive learning experiences strengthen self-efficacy beliefs and outcome expectations (Lent, Brown, & Hackett, 2002), and they eventually nourish an individual's desire and readiness to invest in further education. In sum, work and task immanent learning opportunities allow an individual to advance the knowledge and skills and the career (Dehnbostel, Elsholz, & Gillen, 2007; Stalder & Carigiet Reinhard, 2014).

Hypothesis 1: Individuals are more likely to engage in higher education if they perceive their learning opportunities at the workplace positively compared with those who work without further formal education. Learning in the workplace is embedded in a social situation. Colleagues and team members play a crucial role in shaping an individual's view of what has to be done and also on how things are done, through the development of a shared understanding of career prospects within the team. In addition, learning at work depends on the colleagues' social support (Eraut, 2007; Lave, Chaiklin, & Lave, 1993), and impacts the reflection and definition of career goals and activities (Lent, Ezeofor, Morrison, Penn, & Ireland, 2016; Wang & Fu, 2015). Social support helps people to achieve their self-imposed career goals. On the one hand, social support can foster career aspirations and development (Hofmann, Stalder, Tschan, & Häfeli, 2014). On the other hand, it can hurt an individual's career planning. As individuals become members of a team (Lave & Wenger, 1991; Wenger, 2008), they also develop a mutual feeling of belongingness and identify with the team and with their specific roles within the team. Teams can develop an unwillingness to change the composition and role distribution even if a change may be needed (Rafferty & Jimmieson, 2010). A team member who is planning to complete higher education may spark conflict within the team, as the team might not want to endanger its quality by allowing a team member to move away to complete higher education. Social support is a valuable resource that helps individuals to cope with workplace affordances (Frese, 1989). Taking into account that individuals have a strong need of belongingness (Deci & Ryan, 2008), strong social support could also hinder further higher education, primarily if it results in having to leave the workgroup.

Hypothesis 2: Strong social support causes individuals to become less engaged in higher education. Strong social support is like glue that binds the team members together.

2.2 Sociodemographic Factors

Much research shows that educational pathways depend on social origin, nationality, or gender (Becker, 2016; Ion, Nye, & Iliescu, 2017; Lamamra, 2017). The social origin of a family, as represented by the family's socioeconomic status, was found to be one of the major explanatory variables of educational pathways, whereby a higher socioeconomic status is associated with higher educational expectations (Johnson & Reynolds, 2013; Neuenschwander et al., 2012). Social origin affects the transition from school to education as well as the transition to higher education (Swiss Coordination Centre

for Research in Education [SKBF CSRE], 2014). However, some evidence also indicates that socioeconomic status does not affect a person's decision to follow a higher vocational pathway (Trede, 2016).

Hypothesis 3a: The higher a family's socioeconomic status, the greater the chance that a person in that family will complete higher academic education. We expected no effect of socioeconomic status on completing higher vocational education.

It has been found that it is harder for *individuals with migrant backgrounds* to access higher education. A significant effect of migration status is found in the transition to upper-secondary education (Hupka-Brunner, Sacchi, & Stalder, 2010; Wolter & Zumbühl, 2017) and in the transition to tertiary education (Picot & Hou, 2013).

Hypothesis 3b. Swiss citizens are more likely to become engaged in higher education compared with individuals with migrant backgrounds who are not Swiss citizens.

Gender stereotypes, gendered career expectations, and the socialisation process at home, during compulsory school, during career orientation, and in initial vocational education and training result in very persistent gender differences and inequalities in the Swiss labour market (Hadjar & Aeschlimann, 2014; Lamamra, 2017). We see that many young men choose vocational education and training at the upper secondary level even if their school records would allow them to pursue general academic education.² We expect these young men to proceed towards higher education more often after graduating from initial vocational education and training.

Hypothesis 3c: Men are more likely to participate in higher education than women are after graduating from initial vocational education and training.

2.3 Value of Further Education

Motivational theories on career choices propose that educational values (attainment, interest, utility) and expectations predict educational choices (Wigfield & Cambria, 2010; Wigfield et al., 2017). Values represent the relative importance given to a specific educational choice (Brown & Crace, 1996). If a person does not attribute high value to higher education, little chance exists that this option will be chosen. We expected that only individuals wanting to become engaged in higher education would become engaged in higher education.

Hypothesis 4: The higher the value given to higher education, the more likely that individuals be in higher education within two years.

The hypotheses are summarised in Figure 1.

2.4 Higher Education in Switzerland

As the hypotheses were tested based on a sample of young Swiss workers, it would be helpful to describe higher education in Switzerland briefly. Tertiary education in Switzerland features a two-tier structure: Higher vocational education is called *professional education*, and higher academic education is called *university-based education*.

²Numbers from the Federal Statistical Office, <https://www.bfs.admin.ch/bfs/de/home/statistiken/bildungswissenschaft/bildungsindikatoren/bildungssystem-schweiz/themen/abschluesse/maturitaetsquote.html>, last accessed 16 February 2018.

Higher vocational education and higher academic education are at International Standard Classification of Education Level 6. In this paper, we focus on those who hold a Federal VET Diploma after having completed initial vocational education and training.

Holders of Federal VET Diplomas have three pathways to proceed with their work and educational pathways after graduation: 1) They can work and eventually attend some non-formal, often short-term courses in continuing education and training, 2) they can attend higher vocational education, or 3) they can attend higher academic education on the condition of having baccalaureate degrees.

The vocational track is for most young people the standard pathway to a diploma at the upper secondary level (Stalder & Nägele, 2011). According to data from the Federal Statistical Office, in 2016, 63%³ of the diplomas issued were Federal VET Diplomas, and 15% acquired professional baccalaureates⁴ typically obtained during initial vocational education and training or shortly afterwards. Holders of VET diplomas acquire diplomas in higher vocational education either by passing a federal examination, based on self-reliant preparation for the examination, by attending preparatory courses, leading to a Federal Professional Education and Training (PET) diploma, or by enrolling in study programs at colleges of higher education (Nägele & Bierschenk, 2014; State Secretariat for Education Research and Innovation [SERI], 2016). Higher academic education is accessible via a baccalaureate or after having completed a study program at a college of higher education, and it is delivered via cantonal universities, federal institutes of technology, cantonal or regional universities of applied sciences and arts, and universities of teacher education.

Higher vocational education and higher academic education are positioned as different educational pathways of equal value. Higher academic education is primarily financed by the state, higher vocational education is primarily privately financed by the participants and the employers.⁵ According to the Federal Act on Vocational and Professional Education and Training⁶ and the State Secretary of Research and Innovation (SERI), the aim of higher vocational education is to develop the competences needed to handle challenging technical or managerial activities and to provide the labour market with highly skilled workers (State Secretariat for Education Research and Innovation [SERI], 2016). An individual with a Federal VET Diploma as a carpenter, for example, can complete higher vocational education to specialise in project management, the trade-specific business economy, wood technology, etc. In higher academic education, the options for the same individual are a bachelor's and master's degree in architecture or wood technology, a master's degree in engineering, or many other bachelor's and master's courses (Verband Schweizerischer Schreinermeister und Möbelfabrikanten [VSSM], 2017).

³<https://www.bfs.admin.ch/bfs/en/home/statistics/education-science/diploma/upper-secondary.html>, last accessed 9 February 2018

⁴<https://www.bfs.admin.ch/bfs/de/home/statistiken/bildung-wissenschaft/bildungsindikatoren/bildungssystem-schweiz/themen/abschluesse/maturitaetsquote.assetdetail.4282892.html>, last accessed 9 February 2018

⁵Since January 2018 participants in higher vocational education can apply to get a refund from the state for the preparatory courses, but not for the examination fee.

⁶<https://www.admin.ch/opc/en/classified-compilation/20001860/index.html>

3 Method

3.1 Participants

Our data stemmed from two waves of a multi-cohort longitudinal questionnaire-based survey on educational decisions and educational pathways (BEN), running from 2012 to 2016 in the German part of Switzerland (Neuenschwander, Düggele, Nägele, & Frey, 2017). The selected sample for the analysis consisted of individuals who took part in the second and third waves of the study in 2014 and 2016.

Participants were either recruited through vocational schools (cohort one) or by sending out letters to employers and directly to potential participants (cohort two). A stratified random sample was obtained taking into account occupations and cantons. Individuals from cohort one were close to the end of their initial vocational education and training in 2014, whereas individuals from cohort two had been employed for a few years after graduating from initial vocational education and training. Participants were employed in various sectors, representing the most frequently chosen apprenticeships; for example, they were commercial employees, retail clerks, healthcare workers, social care workers, electricians, information technicians, cooks, logisticians, mechanical engineers, painters, bricklayers, and carpenters. Individuals were selected for the analyses in this paper only if they had not acquired diplomas in higher vocational or higher academic education before 2014 and if they were not completing higher education in 2014. The final sample consisted of 601 individuals.

3.2 Measures

Engagement in Further Formal Education

In 2014 and 2016, individuals were asked to denote all formal education programs they had completed or in which they were actively engaged at the time of the survey. Participants were asked to provide the name of the education alongside with the starting and ending date, respectively, and whether they were still engaged in this education. In higher vocational education examples include technical commercial employees, foreman in the construction business, marketing experts, or food technologists. In higher academic education examples are, a bachelor's degree in business administration or training for a curative teacher and social workers. This information was coded according to the educational level as apprenticeship, baccalaureate, higher vocational education, or higher academic education.

Based on this information, a variable with three levels was constructed: 1 'no graduation from higher education and not in higher education in 2016', $N = 356$, 59%; 2 'having graduated from higher vocational education after 2014 or being actively engaged in higher vocational education', $N = 126$, 21%; and 3 'having graduated from higher vocational education after 2014 or being actively engaged in higher academic education', $N = 119$, 20%.

Workplace Factors

Task immanent learning opportunities and social support were taken from a Short Questionnaire for Job Analysis (Prümper, Hartmannsgruber, & Frese, 1995). This questionnaire is based on the job diagnostic survey (Hackman & Oldham, 1975), an instrument

to assess social support (Frese & Zapf, 1987) and an instrument for stress-related work analyses (Semmer, 1984). These sub-scales are relevant for learning at work (Kammermann, Stalder, & Hättich, 2011; Keller, Meier, Gross, & Semmer, 2015; Nägele, 2013; Stalder & Carigiet Reinhard, 2014).

Learning opportunities at work were assessed with three items (Prümper et al., 1995), for example, 'I can learn a lot of new things at work' based on the skill variety at work. The response scale ranged from 1 'not at all' to 5 'completely', Cronbach's alpha = .77, mean = 3.8; standard deviation = .83, N = 601, min = 1, max = 5, and median = 4.

Social support was assessed with three items (Prümper et al., 1995), for example, 'I can count on my colleagues when it gets difficult at work'. The response scale ranged from 1 'not at all' to 5 'completely', Cronbach's alpha = .77, mean = 4.1, standard deviation = .76, N = 597, min = 1, max = 5, and median = 4.

Sociodemographic Factors

Opt The socioeconomic status of the parents was used as a proxy for the *social origin*. The family's international socioeconomic index was calculated as the highest value of the fathers' and mothers' socioeconomic statuses. This information was based on the parents' occupations, coded according to the classification scheme of the Federal Institute of Statistics. Mean = 51.7; standard deviation = 20.9; N = 601, min = 14.2, max = 88.7, median = 56.

The individuals were asked to name their citizenship according to their passport or identity card. Individuals holding a Swiss and individuals holding a Swiss and any other national passport or identity card were categorised as Swiss citizens. Non-Swiss citizens were those without a Swiss passport or identity card. N = 601, Swiss citizenship N = 550, 91%, non-Swiss citizenship N = 51, 9%.

Gender was assessed with two categories, female and male. N = 601, female N = 371, 62%, male N = 230, 38%.

Value of Higher Education

The value given to further formal education was measured according to Wigfield et al. (2017) with three items. 'I consider further education and training for me as... a) useful, b) important, c) attractive'. The response scale ranged from 1 'not at all true' to 6 'completely true', Cronbach's alpha = .84. Mean = 5.1, standard deviation = .83, N = 600, min = 1, max = 6, and median = 5.

Cohort/Age

The cohort was included in the analyses, as individuals within the two cohorts represented two different career situations. Cohort one had finished initial vocational education and training between 2012 and 2014, whereas individuals from cohort two had been working for several years on their jobs. The cohort corresponded with the age of the individual, as the participants were younger in cohort one than in cohort two. Cohort one N = 350, 57%, age (in 2014) = 21.84 years, standard deviation = 1.7 Cohort two N = 251, 43%, age (in 2014) = 27.7 years, standard deviation 2.5, $t(646) = -21.95$, $p < .01$.

4 Results

4.1 Expectations and Realisation of Educational Aspirations

To describe the sample according to their educational expectations, we first report the results from cross-tabulating educational expectations in 2014 and their realisation in 2016. The expectation of achieving a particular formal educational type was assessed in 2014 with a single item: ‘What is the highest degree you are going to attain in your educational career?’. The response options were tracheotomised: 1 ‘No further formal education, I am fine with a diploma in initial vocational education and training with or without a baccalaureate (graduation on the upper secondary level)’, 2 ‘Federal diploma in higher vocational education’, and 3 ‘Diploma in higher academic education’. Table 1 reveals that only 35% of the individuals who expected in 2014 to achieve higher vocational education were two years later engaged in higher vocational education. For individuals who expected in 2014 to obtain higher academic education, the rate was higher, and it differed between the two cohorts. The rate was 45% for the younger cohort and 70% for the older cohort. The picture was different for those who told us in 2014 that they were planning to stay working, without further formal education at the tertiary level. In 94% of the cases, these individuals were two years later still working and not in higher education. The result also indicated that only a few individuals switched between higher vocational education and higher academic education. In addition, if individuals switched, they switched from higher academic education in 2014 to higher vocational education two years later as can be seen in cohort one featuring the younger individuals.

Overall, these descriptive results indicated that many individuals who told us in 2014 that they expected to attain diplomas in higher vocational education were not engaged in higher vocational education two years later. This was different for individuals who told us that they expected to be in higher academic education. A larger percentage of these individuals were in higher academic education, especially in the older population (cohort two).

Table 1: Educational expectations in 2014 and engagement in higher education in 2016

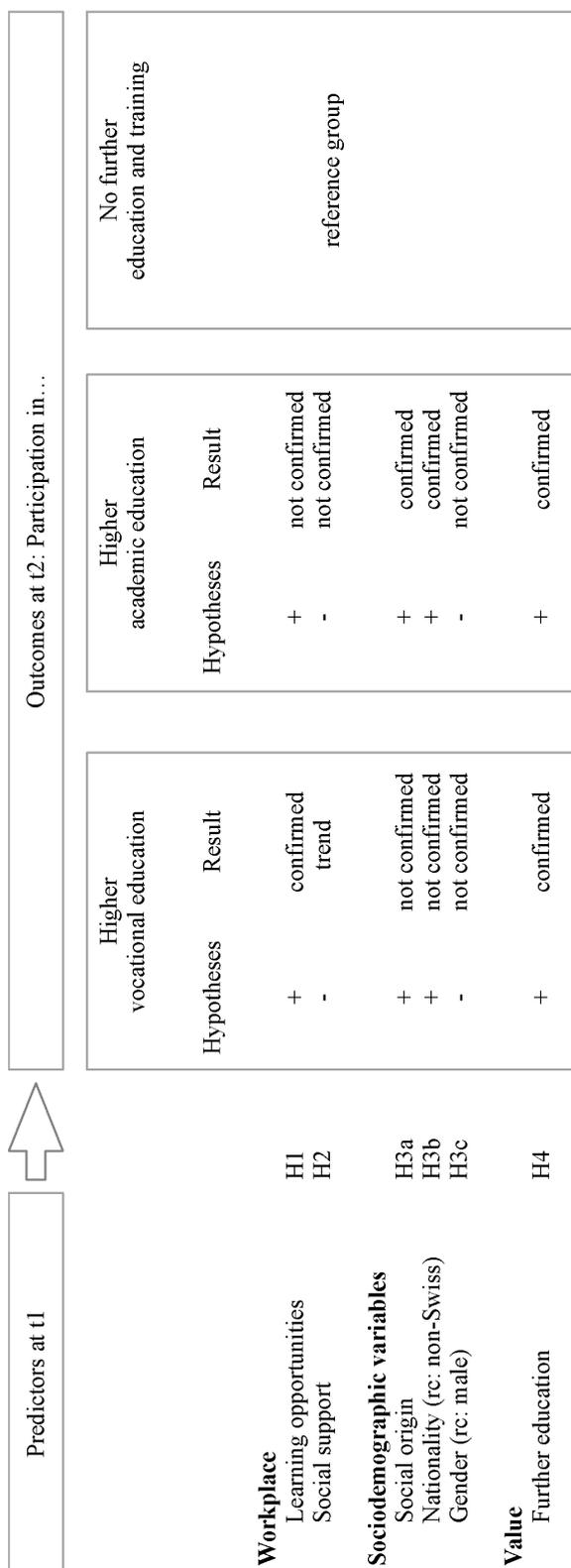
			Higher vocational education	Higher academic education	No higher education	
Higher vocational education	Cohorts 1&2*	N	93	9	165	266
		%	35%	3%	62%	100%
Higher academic education	Cohort 1**	<i>N</i>	16	44	36	96
		expected <i>N</i>	11.9	55.2	28.9	96
		%	17%	46%	37%	100%
		adj. residual	1.8	-3.3	2.3	
	Cohort 2	<i>N</i>	7	63	20	90
		expected <i>N</i>	11.1	51.8	27.1	90
		%	8%	70%	212	100%
		adj. residual	-1.8	3.8	-2.8	
	Cohort 1&2	<i>N</i>	23	107	56	186
		%	12%	58%	30%	100%
No higher education	Cohort 1&2***	N	7	1	124	132
		%	5%	1%	94%	100%

Legend. * $\chi^2(2) = 2.44, p = .30$; ** $\chi^2(2) = 11.29, p < .01$; *** $\chi^2(2) = 1.47, p = .48$; Separate frequencies and residuals for the cohorts are presented only if the χ^2 is statistically significant. Overall: $N = 601$, cases with missing data $N = 17$.

4.2 Results Predicting Participation in Higher Education

To test the hypotheses, we calculated three multinomial regression models: model 1 with only the sociodemographic variables, model 2 with the value variable added, and model 3 with the workplace variables added. The analyses were run using SPSS 25 (IBM Corp., 2017). The results are summarised in Table 2. Due to the number of predictor variables in the model, some cells have zero frequencies, which implies that the standard errors need to be checked for unusually high values (Field, 2013). The results in Table 1 indicate that no conspicuous standard errors exist. It is notable that sociodemographic variables alone could not explain engagement in higher vocational education (model 1). Gender, which was a significant predictor of higher vocational education in model 1, had no effect after we controlled for learning opportunities and social support (model 3). The results revealed two distinct sets of predictor variables for higher vocational education and higher academic education. Learning at the workplace and (marginally significant) team support predicted engagement in higher vocational education, whereas social origin and nationality predicted engagement in higher academic education. The value attributed to further higher education was predictive for both higher vocational education and higher academic education.

The hypotheses are discussed in detail based on model 3, and the results are summarised in Figure 1. Hypothesis 1 was partly confirmed, as a positive effect of learning opportunities on engagement in higher vocational education was found, odds ratio = 1.71, $p < .01$, but this was not so for higher academic education, odds ratio = .80, $p = .14$. Hypothesis 2 was not confirmed, as social support had no significant effect on engagement in higher education, neither for higher vocational education, odds ratio = .74, $p = .06$, nor for higher academic education, odds ratio = 1.02, $p = .89$. However, the result for higher vocational education was only marginally non-significant, indicating that social support might hinder further higher vocational education. Hypothesis 3a was confirmed, as higher socioeconomic status predicted engagement in higher academic education, odds ratio of 1.02, $p = .02$, but not in higher vocational education, odds ratio = 1.00, $p = .89$. Hypothesis 3b was partly confirmed, as a higher chance existed for Swiss citizens to complete higher academic education, odds ratio of 4.51, $p = .01$, but no effect was found for higher vocational education, odds ratio = 2.12, $p = .08$. Hypothesis 3c was not confirmed, as gender had no effect on being engaged in higher education, neither in higher academic education, odds ratio of .66, $p = .08$, nor in higher vocational education, odds ratio = .72, $p = .15$. Hypothesis 4 was confirmed, as the value had a substantial effect on becoming engaged in higher academic education, odds ratio = 2.84, $p < .01$, or in higher vocational education, odds ratio = 2.88, $p < .01$. The cohort was used as a control variable with an effect on being engaged in higher academic education, odds ratio = .38, $p < .01$, indicating that younger individuals from cohort one were less likely to attend higher academic education within two years. It takes more time to start with higher academic education, for example, because individuals need to acquire vocational baccalaureates before gaining access to it. In addition, formal education programs typically start once a year, in autumn, whereas higher education programs can often be completed on a short-term basis.



Legend. rc = reference category; Predictor variables: + positive effect, - negative effect expected; Results: confirmed = statistically significant 5 % niveau, trend = statistically significant 10% niveau, not confirmed = no statistical significant effect found

Figure 1: Summary of the hypotheses and results, based on model

Table 2: Multinomial logistic regressions, higher vocational education, and higher academic education compared with the group with no further formal education

Reference category: <i>No higher education</i>	Model 1					Model 2					Model 3							
	B	Std. Error	Wald	df	sig.	odds ratio	B	Std. Error	Wald	df	sig.	odds ratio	B	Std. Error	Wald	df	sig.	odds ratio
Higher vocational education																		
Intercept	-1.45	.46	9.87	1	.00		-7.14	1.07	44.74	1	.00		-8.03	1.27	40.17	1	.00	
<i>Sociodemographic variables</i>																		
Social origin	.00	.01	.01	1	.93	1.00	.00	.01	.04	1	.84	1.00	.00	.01	.02	1	.89	1.00
Nationality (rc: non-Swiss)	.45	.40	1.27	1	.26	1.57	.68	.41	2.71	1	.10	1.98	.75	.42	3.13	1	.08	2.12
Gender (rc: male)	-.48	.22	4.94	1	.03	.62	-.40	.23	3.12	1	.08	.67	-.33	.23	2.05	1	.15	.72
Cohort (rc: cohort 2)	.42	.23	3.47	1	.06	1.52	.19	.24	.65	1	.42	1.21	.24	.24	.98	1	.32	1.27
<i>Values</i>																		
Further education							1.09	.18	38.14	1	.00	2.96	1.06	.18	36.04	1	.00	2.88
<i>Workplace</i>																		
Learning opportunities													.54	.16	10.82	1	.00	1.71
Social support													-.30	.16	3.48	1	.06	.74
Higher academic education																		
Intercept	-2.80	.63	19.91	1	.00		-8.22	1.14	52.02	1	.00		-7.44	1.30	32.51	1	.00	
<i>Sociodemographic variables</i>																		
Social origin	.02	.01	11.91	1	.00	1.02	.02	.01	9.18	1	.00	1.02	.02	.01	9.19	1	.00	1.02
Nationality (rc: non-Swiss)	1.34	.55	5.91	1	.02	3.83	1.50	.56	7.16	1	.01	4.49	1.51	.56	7.16	1	.01	4.51
Gender (rc: male)	-.40	.23	3.21	1	.07	.67	-.37	.24	2.45	1	.12	.69	-.42	.24	3.17	1	.08	.66
Cohort (rc: cohort 2)	-.74	.22	11.10	1	.00	.48	-.94	.24	16.06	1	.00	.39	-.96	.24	16.15	1	.00	.38
<i>Values</i>																		
Further education							1.05	.18	35.53	1	.00	2.86	1.04	.18	33.53	1	.00	2.84
<i>Workplace</i>																		
Learning opportunities													-.22	.15	2.24	1	.14	.80
Social support													.02	.17	.02	1	.89	1.02
Model fitting information																		
-2 log likelihood							1058.94 / 931.30						1135.97 / 993.90					
Intercept Only / Final	853.30 / 801.11						$\chi^2(10) = 127.64, p < .01$						$\chi^2(14) = 142.07, p < .01$					
Likelihood ratio test	$\chi^2(8) = 52.19, p < .01$						$\chi^2(1004) = 965.67, p = .80$						$\chi^2(1170) = 1164.34, p = .54$					
Goodness-of fit	$\chi^2(638) = 661.52, p = .25$						600						596					
Valid N	601						600						596					
Nagelkerke R ²	.10						.23						.25					

5 Discussion

In this paper, we examined the effects of workplace characteristics (social support, learning opportunities), of sociodemographic factors (social origin, nationality, gender), and of the value assigned to higher education as predictors of engagement in higher education.

We found predictors of being engaged in higher education that differ between higher vocational and higher academic education. Following an individual's graduation from initial vocational education and training, workplace factors predict engagement in higher vocational education, and sociodemographic factors explain engagement in higher academic education. A significant predictor for both groups is a high value attributed to higher education.

Within the two years during the course of the study, we found that many individuals with the expectation of attaining higher vocational diplomas in 2014 were not engaged in 2016 in higher vocational education (66 %), which was different for higher academic education, where fewer individuals were not yet involved in higher academic education (55% in the younger cohort, 28% in the older cohort). This signifies that many individuals with the expectation of achieving higher education diplomas were not yet actively engaged in higher education.

Individuals who see learning options at the workplace will more likely complete higher vocational education rather than continue working. Positive social support seemed to hinder higher vocational education, although this result needs to be interpreted cautiously, as it is only marginally significant. Contrary to our expectation, the sociodemographic variables of social origin, nationality, and gender had no significant effect on completing higher vocational education. Higher vocational education seems to be less socially selective compared with higher academic education. The effect of learning opportunities at work is of greater importance. This finding is in line with reports on the positive effects of informal learning on an individual's motivation to develop specific job-related competences (Janssens et al., 2017). This finding points to the considerable function of workplace learning as a way of motivating employees to develop their professional competences, which is the responsibility of individuals and organisations. A proactive individual can create learning opportunities, for example, through job crafting (Wrzesniewski & Dutton, 2001). It seems to be worthwhile for organisations to reflect on how to support learning in the workplace and to discuss and implement supportive learning cultures. Organisations with learning cultures can create, acquire, and transfer knowledge and can reflect this knowledge and change its behaviour (Garvin, 1993), as this positively affects commitment and intrinsic motivation (Joo & Lim, 2009). To promote engagement in higher vocational education, it seems necessary to design a workplace that is favourable for learning. Only if individuals experience that learning at work is possible will they invest in further learning in higher vocational education, as they can expect the transfer of the new knowledge and skills to the workplace to be possible.

The picture for individuals engaged in higher academic education was somewhat different, partly as expected. The sociodemographic variables of socioeconomic status and nationality were as expected the best predictors, besides the value of further education. However, the workplace factors were of no importance.

6 Limitations

Although the study achieved its aim and the hypotheses could be tested, some limitations should be pointed out. It would be interesting and necessary to replicate these findings for specific trades. Despite the large sample size, these analyses would result in even more cells with zero frequencies. Replications should be done with a focus on specific trades to reduce the variance in the sample selected. Workplace factors were measured as self-reports in this study. To achieve a more in-depth understanding, we suggest that a more detailed measurement of workplace learning, social support, and satisfaction, moreover from different perspectives and as repeated measures over a more extended period, could provide valuable insights into how workplace factors shape motivation for engagement in higher education.

7 Conclusion

The examination of the realisation of plans for higher education over time and relating individual and workplace factors have pointed out considerable differences between individuals in higher vocational education and higher academic education. Individuals are engaged in higher academic education due to their social origins and nationalities. This finding adds to the existing knowledge that native people from families with better access to education have a higher likelihood of attending higher academic education. These processes of social exclusion and social selection processes seem to be very persistent.

On the other hand, we see that higher vocational education seems to offer socially non-discriminating access to higher vocational education, even if higher vocational education is financed primarily privately by the participants and the employers. Higher vocational education is positioned as a provider of highly skilled workers for the labour market. We find that the chance to become involved in higher vocational education increases if individuals have learning opportunities in the workplace and if their colleagues do not hinder them if their social integration is too tight. Instead, it is the work environment, namely the perception of learning opportunities and social support, that promote higher vocational education. Individuals wanting to complete higher vocational education should try to find or craft a workplace that allows them to learn. In addition, companies that want their employees to move towards higher vocational education should support them by designing workplaces as learning places. The unique contribution of this paper is to compare these two distinct patterns of becoming engaged in higher vocational or higher academic education.

From a theoretical point of view, we need to look at predictors of educational pathways besides sociodemographic variables. We should integrate variables related to workplace factors in our theories and empirical models.

From a policy perspective, this study described an example where higher vocational education was designed as a parallel strand to higher academic education, which is chosen by individuals with a distinct profile. It is noticeable that some people seem to be motivated by the work environment to continue their education in higher education, whereas others are motivated by heritage, which is linked to status.

Overall, we still need to find answers to deal with the finding that social origin and, in our results especially, nationality are important factors that steer access to higher academic education but not to higher vocational education. It might be worth looking at selection and socialisation processes during vocational education and training more closely to understand the discriminative processes that contribute to the discrimination of individuals from a motivational perspective. Most importantly, a closer look at factors that hinder individuals at work from becoming engaged in higher vocational education is necessary. We have seen that many individuals who wish to complete higher vocational education do not do this. These individuals start their higher education as a result of an appropriate job design. Learning opportunities in the workplace trigger their engagement, factors that can be shaped by both individuals and companies.

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Staying in the Loop: Formal Feedback Mechanisms Connecting Vocational Training to the World of Work in Europe

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Abstract

Context: Vocational education and training (VET) is expected to be designed for creating learning outcomes which meet the needs for skills and competences in the labour market. Hence, identifying current and upcoming skill requirements and ensuring that these requirements are incorporated into education has long been the subject of academic and policy discussion. Governance processes keeping VET systems up-to-date have been more recently addressed as ‘feedback mechanisms’. The term broadly summarizes the interplay of institutions, actors and processes which allows the continuous renewal of VET provision (i.e. by creating new qualifications or updating curricula). The aim of the paper is to enhance the understanding of cross-national variations in formally institutionalised ‘feedback mechanisms’ between VET and the labour market.

Method: The research builds on a comparative analysis of case studies in 15 European countries. The paper presents examples for four different ‘formal feedback mechanisms’ in Germany, France, England, and Austria.

Results: Four main types of formal mechanism have been identified: 1) The liberal model explained by VET in England and Higher VET in Austria; 2) The statist model explained by school-based VET in Austria; 3) the participatory model explained by VET in France and 4) the coordinated model explained by apprenticeship training in Germany and Austria.

Conclusions: Existing approaches in the economic sociology of labour markets, the varieties of capitalism approach as well as comparative research on welfare states are useful

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in predicting whether particular VET systems are likely to be predominant. However, they do not provide an alternative in describing differences in VET systems which the concept of formal feedback mechanism does. Moreover, by analysing formal feedback mechanisms, it is possible to demarcate where a VET sub-system ends and another VET sub-systems begins. In this sense research presented here also asks for new standards for comparative VET research as it suggests that entities to be compared are not countries' overall VET systems, but their potential sub-systems.

Keywords: VET, Vocational Education and Training, Vocational Education, Labour Market, Governance, Feedback Mechanism, Cross-Country Comparative Research

1 Introduction - How to Keep VET Curricula Relevant Over Time?

In his otherwise remarkable account of education as a social institution, US sociologist David Baker (2014) recounts an often-heard plea of the allegedly inevitable obsolescence of vocationalism. Baker sees little future for vocational education as part of secondary education and summarises accounts of its declining significance. He argues that vocational education cannot but falling behind the rising and ever-changing demands of today's economies' workplaces, which demand universal cognitive skills thought to be developed best by general schooling. Whatever vocational tracks might deliver, it cannot avoid becoming outdated soon, often even before young VET graduates enter the labour market.

Contrary to its assumed decline, vocational education has attracted much policy attention in the years after the 'Great Recession' starting in 2008 and is thought to be an effective tool in combating youth unemployment. Germany's most recent staggering economic success and its plummeting unemployment figures have moved once more the German VET system into the spotlight, after being marketed as the heart of the 'German Skills Machine' (Culpepper & Finegold, 1999) already a decade earlier. Although disputed by a few researchers (Hillmert, 2008), the German dual system is generally regarded as an inevitable proof that initial VET can match the needs of today's world of work and even serve as powerful flywheel of innovation and competitive advantage.

The questions of program and curricula reform in general education have matured into a well-established field of research (Connelly, He, & Phillion, 2008; Wyse, Hayward, & Pandy, 2015). However, for initial vocational education, systematic research on reform of provision and content is relatively scarce. With the exception of a few studies on behalf of international organisations which occasionally used the term 'feedback mechanism' to describe the interplay between the labour market and the education system (Cedefop, 2009; Fretwell, Lewis, & Deij, 2001), the concept has been hardly used. The term, which has not yet been developed into an analytical concept, broadly summarizes the interplay of institutions, actors, and processes in place aiming at the continuous renewal of VET provision (i.e. new qualifications or curricula).

This paper discusses variants of these 'feedback mechanisms' in VET across the European Union member states against the backdrop of existing typologies of VET and

skill formation systems. For the purpose of this article ‘formal feedback mechanisms’ are defined as purposefully implemented formal institutional procedures, determining the particular roles of various stakeholders in planned renewal of VET provision. The term ‘formal’ signals that the feedback mechanisms in question have some form of legal foundation and are established on a permanent basis. It will be shown that while some types of ‘formal feedback mechanisms’ require particular institutional environments they represent nevertheless an independent entity with a relative autonomy vis-à-vis the overall institutional framework of VET or the political economy. This relative independence will be illustrated by showing that different VET sub-systems in one country can employ different types of ‘feedback mechanisms’.

Our discussion builds on a comparative analysis of 15 European countries coordinated by the lead author on behalf of CEDEFOP (European Centre for the Development of Vocational Training) from 2012 to 2013 (Cedefop 2013). In total, 77 national and European experts were interviewed. Two types of experts were interviewed: On the one hand senior officials in ministries for education and/or employment and social partners at national level¹, on the other hand VET researchers at universities and national VET institutes. Interviews were conducted either in person or via telephone. A detailed guideline for the case studies was provided including a list of potential types of interviewees. Furthermore, a number of common sources (such as various Cedefop and Eurydice reports) were considered obligatory. Other sources such as white papers, regulations, laws on VET, existing national research on feedback mechanisms, on social dialogue as well as on other forms of communication and interaction in the field of VET and labour market were consulted. For this article information has been updated where required.

The paper is structured as follows: In section 2, we discuss in more detail the idea of a ‘formal feedback mechanism’ by comparing the more complex case of VET to reforms of curricula in general education. In section 3, we present examples for four different ‘formal feedback mechanism’ in Germany, France, England, and Austria, which represent all types found in the aforementioned study (Cedefop, 2013). In section 4, the identified types of formal feedback mechanisms are displayed in a more systematic manner and discussed against the backdrop of related typologies on skill formation and VET systems and conclusions are drawn for future cross-country comparative VET system research.

¹For instance, in England this included interviews with representatives of the UK Commission for Employment and Skills, and the Trade Union Congress. For Germany, the Standing conference of the Ministers for Education and Cultural Affairs of the Länder; the Ministry of Education, Science, Continuing Education and Culture of the Land Rhineland-Palatinate; the German Industry Board for Vocational Training; the Industry Union Construction, Agriculture and Environment; and the Chambers of Commerce and Industry. For Austria, the Federal Ministry of Education, the Arts and Culture, and the Austrian Chamber of Commerce. For France, the Centre for Employment Studies; the Centre for Research on Qualifications and the Education Commission. 15 interviews were conducted in Germany, five in France, five in England and four in Austria.

2 The Significance of ‘Formal Feedback Mechanisms’ for Research on Governance in VET

Contrary to the multifaceted curriculum research in general education, research on initial VET either adhere to a rather reductionist ‘functional’ perception on how education might stay in line with the needs of the world of work (see entries in Rauner & Maclean, 2008) or pay little attention to the topic of change at all. Consequently, research on curricula development in VET is scattered, restricted to single national contexts, and has not developed into a research field in its own right. There are a number of good reasons why this is the case:

- **Sheer Numbers:** While most countries have one or maybe two dozen different curricula of upper secondary general education, vocational education at upper secondary or post-secondary level is much more varied, with many countries having more than 200 programmes in place.
- **Standardisation:** While upper secondary general education is standardised in practically all countries, for VET curricula, the canon and the expected education outcomes are standardised only in some countries. There are also countries, where VET programmes preparing for one and the same occupational field are quite distinct.
- **Proximity of programmes to occupational fields/industries:** Although there are differences in the degree of ownership, business interest organisations and the trade unions, often enjoy a strong say on what is going on in the particular vocational tracks relevant to their industries.
- **Public funding:** While general upper secondary education is mainly funded by the state, the picture is more diverse for vocational education. Some types such as the dual system of apprenticeship require strong financial contributions by the employers.
- **Transitions to/usefulness for employment as one additional value:** Vocational education may partake in the values of general education, provide access to further levels of education or adhere to an innate ethos of professionalism; yet, contrary to general education, vocational education by definition is designed to prepare first of all for access to the labour market and frequently, additionally to particular types of jobs in particular occupations.

In particular this last point forms the rationale of vocational education and determines its particular ideology. Vocational education therefore needs to respond to changes in what the world of work demands and simultaneously has as a knock-on effect, it actively changes how work is done. Contrary to general education, a constant and prompt change of both curricula and canon in line with the ever-changing demands of the workplaces is an essential issue for vocational education.

For general education as for VET, there are actors – administrative units or consultative bodies – in charge of the further development and the renewal of the type of programmes, the ‘time tables’ and the content to be delivered. While in general education, it seems so natural that units of ministries of education oversee curricula development and that educational insiders (e.g. university experts in charge of training the next teacher generations, teachers of a particular subject) work on the ‘ways forward’, for VET – reflecting on the arguments outlined above – other actors are natural candidates for such a task. It is one of the key arguments of this paper, that such governance processes and the way they include actors and vantage points beyond the ‘small world of education’, are even more vital for VET than for the more self-sustained general education.

‘Formal feedback mechanisms’ usually comprise important decision-making or consultation bodies (e.g. *Sector Skill Councils* in England or the *General Council for Vocational Training, Consejo General de Formación Profesional – CGFP*, in Spain, or the *Trade committees* in Denmark). ‘Key actors’, we distinguish for further analysis, include:

- ‘The government/administration’, as ministries of education, awarding bodies, qualification authorities
- ‘The education and training providers’, including schools, colleges, yet, also enterprises providing VET for their employees. Where available, umbrella organisations of education providers may have a role.
- ‘The social partners’, representing organised and thereby aggregated interests of the employees (trade unions; professional organisations) and the employers (chambers of trade, business interest organisations).
- ‘The labour market’, understood as the interplay between a set of individual employers (demanding skills) and individual workers or graduates (future workers) (supplying skills).

It is important to distinguish ‘formal feedback mechanisms’ as inbuilt governance structures from informal feedback processes. Various forms of informal feedback processes are found in all countries and in any arrangement of VET labour market coordination. Typical examples of informal feedback mechanisms are local school boards, alumni networks, career fairs, cooperative projects between schools and companies, and internships. These informal processes do not necessarily result in any formal changes at national level (e.g. new standards or curricula) although they can be equally or even more important to keep VET relevant for the society and the labour market than formal ones.

A second important distinction is that ‘formal feedback mechanisms’ need to be differentiated from procedures for ‘whole sale’ VET reform. Major or radical VET reforms are typically the prerogative of the responsible parliaments. In contrast, formal feedback mechanisms, inbuilt in the VET system, are expected to keep VET in line with the intentions of the original legislation and allow for the constant and planned ‘renewal of VET’. In theory, the mechanism allows to sustain the quality and relevance of VET over

time by regularly changing details. Practically, any mechanism for adjustment to changing environments might provoke ‘incremental change’ (Mahoney & Thelen, 2010), as no adaptation will simply reestablish a previous state. Adaption is likely to either improve the overall setting or imply a step backward when compared to previously achieved levels of fit. Formal feedback mechanisms partly have been implemented as a ‘short-cut’ to time-consuming and improperly resource-demanding procedures of formal law making, where any changes of programmes or curricula would require a formal law issued by the competent national or regional parliaments.

In contrast to the functioning of formal feedback mechanisms, radical change in VET refers to changes in the foundational structures of VET, implying a fundamental change of actors, roles, funding, procedures, hierarchies of programmes, and outcomes. In this sense radical change usually describe a system change or an extension to an existing system. Western Europe, for example, has seen a series of radical VET reforms in the late 1960, when today’s legal base of VET has been formulated, for example, in Germany and Austria (Busemeyer, 2009), (Graf, Lassnigg, & Powell, 2012). The introduction of the ‘baccalauréat professionnel’ (Bac Pro) in France in 1985 or the ‘Berufsmatura’ (an external exam providing general access to higher education for skilled workers) in Austria in 1997 are other examples of VET reforms not forming part of any feedback mechanisms as understood here.

3 Four Types of Formal Feedback Mechanism Identified in Europe

In the following chapter, we present examples for four different models of formal feedback mechanisms in four different countries: Austria, France, England and Germany. Furthermore, for Austria we demonstrate the co-existence of three different models of feedback mechanisms in three different subsystems of VET: higher VET, the dual system and school-based VET.

3.1 The Liberal Model: VET in England and Higher VET in Austria

The ‘liberal’ model of feedback mechanism relies strongly on what might be perceived as an ideal type education market of (individual) ‘sellers’ and ‘buyers’. Even in absence of a formal institution, it is assumed that VET providers are able to respond to the needs of the labour market in a direct and non-mediated way: Insofar as VET programmes meet the needs of employers, they are also sought after by learners who value the competitive advantage in the labour market provided by the well-matched qualification. The state’s role in these educational markets is a restricted one, setting the rules for (co-)funding and competition, yet, refraining from any intervention in the types of programmes offered or the curricula taught. However, when public money is involved, there is also an interest in quality assurance of the provision. Therefore, the presence and frequent change of various institutional quality assurance requirements accompany market-centered approaches to VET.

The liberal feedback mechanism as such intends to improve the functioning of the market-based approach by requiring (1) some systematic reporting on market processes to demonstrate that the educational supply actually meets the aims of the learners and the demands of the employers and (2) by giving voice to single market players, typically representatives of individual enterprises, who are thought as being able to report first-hand insight on on-going changes in their industries. The liberal feedback mechanism does not foresee any strong role for organised interest groups. Moreover, it is not set up to provide strong guidance to the field, yet, simply adds to the functioning of the informal market mechanisms (compare Figure 1).

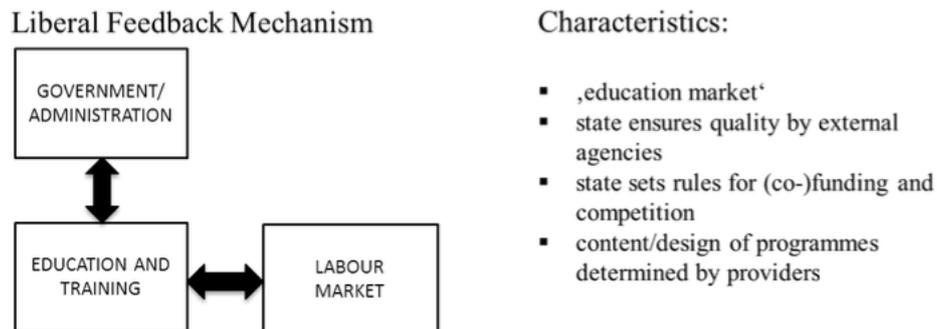


Figure 1: The liberal type of feedback mechanism and its characteristics

Source: Authors

We find a combination out of a market-based approach and forms of 'liberal feedback mechanisms' in many industrialized countries in the area of continuing vocational education and training (CVET), where the state's role is limited and for which firms or individuals pay the lion's share. While it is the standard model for CVET it is interesting to see in which other areas it appears. For this purpose, we use the example of initial VET (IVET) in England and Higher VET in Austria.

In England, upper secondary VET is generally provided within a highly multifaceted further education sector, which caters both for young people preparing for entry to the labour market, and adults, who intend to extend their qualifications, often combining part-time work with education. As such the further education sector is the major provider of post-compulsory IVET. Providers shape their programmes in accordance with established professional norms (and often in cooperation with professional organisations) and the perceived needs of students and employers. In the absence of state regulation, IVET providers tend to conform to professional patterns of good practice established among the educational organisations in their field.

A distinctive feature of the English system is the plethora of qualifications, providers and individual awarding bodies (Wolf, 2011). With such a multitude of IVET providers – rather than a regulated number of state-controlled schools or colleges – 'transparency instruments' are needed. Governance of IVET is implemented via the definition and renewal of occupational standards on the national, sectoral, or regional level. IVET

providers are expected to conform to these standards. A number of agencies are involved in the formulation and renewal of IVET. One such agency is the *UK Commission for Employment and Skills* (UKCES). The UKCES plays an important role in leading the VET policy agenda and oversees the development of the *Sector Skills Councils* (SSCs) by regulating operating licenses (UKCES, 2011). The UKCES operates on a 'social partnership' basis with representation of businesses, the public sector, and trade unions on the Board. The *Office of Qualifications and Examinations Regulation* (Ofqual) is primarily responsible for overseeing the quality of IVET. Ofqual ensures that qualifications, examinations, and assessments provide the basis for future progression of all learners. Ofqual regulates and monitors organisations that award qualifications. The SSCs determine which awarding bodies are able to offer a qualification. To receive SSC approval all units in a qualification must be directly related to a specific National Occupation Standard (NOS), which are developed by the SSC to reflect current employer requirements. Qualifications must also comply with the requirements of the Qualifications and Credit Framework to be approved by an SSC, and therefore to be eligible for Ofqual accreditation.

The *Sector Skills Councils* (SSCs), introduced in 2003, are the latest attempt to add a 'formal feedback mechanism' to the market-focussed approach. The SSCs are voluntary, employer-led coordinating bodies that aim at improving the coordination with regards to IVET and skills supply between employers in a single sector and between employers and educational service providers catering for a sector's particular needs (see also European Commission & Ecorys, 2010). *Sector Skills Councils* are licensed private bodies, supported by core groups of sectoral employers which aim to promote the active participation of relevant enterprises in their work, and which until 2010 received grants to assist in this process (Funding rules have drastically changed since 2010, as councils have to apply for project money in competitive procedures instead of receiving a lump sum funding). Core tasks of SSCs include labour market intelligence, the promotion of company training, the creation and support of modern apprenticeship schemes, and actively contributing to the formulation and incremental improvement of occupational standards relevant for the sector, usually in close cooperation with established bodies responsible for formulating occupational standards. Typically, councils are responsible for contributing to high numbers of occupational standards for particular activities. Based on updated standards, training providers are expected to implement any changes on their own, and moreover, provide the framework for IVET qualifications. SSCs are responsible for organising employer-led feedback on changing occupational standards, training and apprenticeship projects – including input from various employers and further education providers. This should increase cooperation within the sector, leading to mutual learning and the development of more shared practice. By 2015 23 Sector Skill Councils and Bodies had been established, and had survived an evaluation and re-licensing process.

Up to now evidence on the effectiveness of SSCs has been mixed (Payne, 2008; Payne & Keep, 2011). Typically, due to the voluntary basis on which they operate, the councils reach out only to a small minority of organisations in their sector (House of Commons: business innovation and skills committee, 2012). Furthermore, SSCs tend

to fail in representing their sector as a whole or achieving interest aggregation for larger shares of the enterprises in the sector. Consequently, they are unable to play a role similar to the one of sectoral business associations in coordinated market economies (see below).

Although situated in a completely different institutional environment, we can find the logic of combining a market-driven approach with a liberal feedback mechanism also in a specific part of the Austrian education system, namely in higher vocational education. In contrast to universities, universities of applied science (*Fachhochschulen*), which only started in the mid 1990ies aim at providing a research-grounded vocational qualification. This implies that programs are tailored to specific occupational fields. Periods of work placement form a mandatory part of the bachelor curriculum. Programs are developed, in their majority, by non-public (although publicly funded) not-for-profit providers. They are subject to a specified accreditation and evaluation procedure by the *Agency for Quality Assurance and Accreditation Austria* (AQ Austria) which oversees also public and private universities (Bernhard, 2011). Social partners are represented in the AQ Austria and are therefore involved in the review and approval procedure of applications to set up study courses and their quality assurance, but they have only a minor role. The minister for education supervises the agency and decides upon financing of study programs.

The demand for a new study course or the change of existing education and training content is frequently expressed by single local companies, business interest groups of a sector, sector specific organisations of the *Austrian Economic Chambers* or other occupational and sector specific associations. Impulses also come directly from federal states and municipalities. Finally, the providers themselves have a strong incentive to 'screen the market' for new ideas and examples and develop new programs in order to receive state funding; in this point, their situation strongly resembles the situation of providers in the further education sector in England. The feasibility of the planned curriculum and the overall concept of the programme need to stand the test of a particular form of survey-based evaluation. In the evaluation, both potential future employers and potential participants need to confirm that the programme can be expected to meet the needs of the labour market and to attract a sufficiently large student body. This feasibility study also forms part of the application for the accreditation of the programme (Messerer, Markowitsch, Sohm, & Balfe, 2006). The application has to be addressed to the *AQ Austria*, which in a board meeting decides upon the approval.

As in the case of IVET qualifications in England, for the Austrian approach in the field of higher VET, we can speak of an education market in which the state ensures the quality of the provision by an external agency and provides funding. The specific design of the qualification, in terms of its content, is left to the providers and their direct interaction with labour market representatives.

3.2 The Statist Model: School-based VET in Austria

In a majority of countries where initial vocational education is state-funded, state-run, and state-controlled, variations of the statist model of feedback mechanism can be found.

In these countries, the feedback mechanism consists typically in the form of a board, a committee, or a temporary working group, established by the ministry of education and responsible for developing new curricula or educational standards. Actors represented include experts from various fields: the schools (e.g. school principals, experienced teachers in a particular subject), researchers, various governmental bodies, non-governmental organisations, and the corporate world. However, the decision to change curricula ultimately lies with the responsible department of the ministry. Individual actors on the boards are invited to participate based on their expertise. The initiatives can come either from the ministry itself, or from certain schools pooling their interests or strong single actors, e.g. large manufactures or professional associations. Often, initial proposals are rather vague, and of the type ‘something has to be done’ or ‘it is about time for a change’.

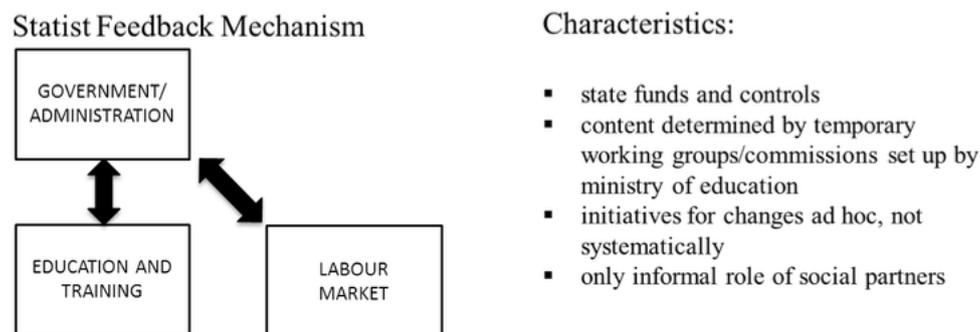


Figure 2: The statist type of feedback mechanism and its characteristics

Source: Authors

We take the example of school-based VET in Austria to illustrate the statist feedback mechanism (see Figure 2). School-based vocational education makes up almost 40 per cent of a youth cohort and half of all participants in vocational education in Austria. There is a large variety of higher-level VET colleges and corresponding VET schools in various technical domains, and in fields such as business administration, tourism, or agriculture. While enjoying some autonomy, schools follow compulsory national curricula, which are fundamentally updated only over a long period of time (about 10 to 15 years). However, smaller changes can be implemented at short notice. Specialised Administrative Units (*Fachabteilungen*) within the Ministry of Education are responsible for particular occupational fields and its VET colleges and schools.

While there are some more regular opportunities for exchange (e.g. yearly conferences), interaction with organised interest groups is not formalised and the collection of feedback from employers and employees takes place only informally. Senior teachers of vocational subjects and school principals, who are in a constant exchange both with one another and the *Fachabteilungen*, are another important source for information. VET teachers become aware of new and changing requirements in the world of work through

their interaction with firms on the local and/or sectoral level via research projects and compulsory internships undertaken by students, or through their own personal networks. However, it is the responsibility of the *Fachabteilungen* to draw conclusions and take concrete steps forward to update curricula. When a firm believe is articulated, that change needs to be implemented, proposals are developed by commissions (*Lehrplankommission*) consisting of VET teachers representing all relevant regional VET schools. Typically, a series of forums and conferences support the exchange process with social partners, sector experts, and individual firms. Participation of any actors within the '*Lehrplankommission*' beyond the *Fachabteilung* and VET teachers is voluntary and hints given remain informal. However, even in absence of a formal role, the strong influence of Austrian social partners on curricula reform must not be underestimated. Beyond informal participation in the preparation of regulation on curricula, recognised social partners typically enjoy the right to consultation on any formal regulation prior to implementation (Cedefop, 2013; Henkel & Markowitsch, 2005).

Attractiveness of school-based VET in Austria has steadily increased over the past two decades, attracting as many students as the long-time dominating apprenticeship sector (see below). The equal importance of two modes of VET on upper secondary level has motivated several observers to call the Austrian IVET approach a 'hybrid system' (Busemeyer, 2013; Graf, 2013; Graf et al., 2012). Previous typologies of VET have categorised Austria's VET system alongside the German one as dual (apprenticeship type). However, it is crucial to recognize that the Austrian apprenticeship system and school-based VET form two distinct sub-system of IVET with distinct and independent feedback mechanisms. The statist model of feedback mechanism also exists in Germany in the school-based VET sector, in parallel to the coordinated model of the dual system (see below). The list of countries where (mainly) statist feedback mechanisms in VET have been identified further includes Bulgaria, Estonia and Sweden.

3.3 The Participatory Model: France

The statist model is certainly the most frequent model of feedback mechanism in VET at upper-secondary level in Europe. As described in the previous section for school-based VET in Austria, in the statist feedback mechanisms, social partners may be consulted in an informal ad hoc way to contribute to reform processes. However, in other cases social partners may have a more distinct and clearly shaped role, and they are consulted at different stages in the change process and on various tasks, including the definition of VET curricula or standards. This is for instance the case in France, Hungary or Finland, and it is an important variation of the statist model. Although the VET systems in these countries can also be characterised as 'state-regulated' or 'statist', the role of social partners on VET is much more pronounced as in states with a 'statist feedback mechanism' as in Bulgaria or Estonia. We therefore suggest to distinguish a participatory model of feedback mechanisms (with more formalised influence of social partners) from the statist model of feedback mechanism (with only informal roles for the social partners) described in the previous section.

VET in France provides a good case for a VET system with a feedback mechanism demonstrating the participatory model (see Figure 3). IVET in France is centralised and embedded in the comprehensive education system in which the state has sole responsibility for content of curricula and examinations (Ogunleye, 2011).

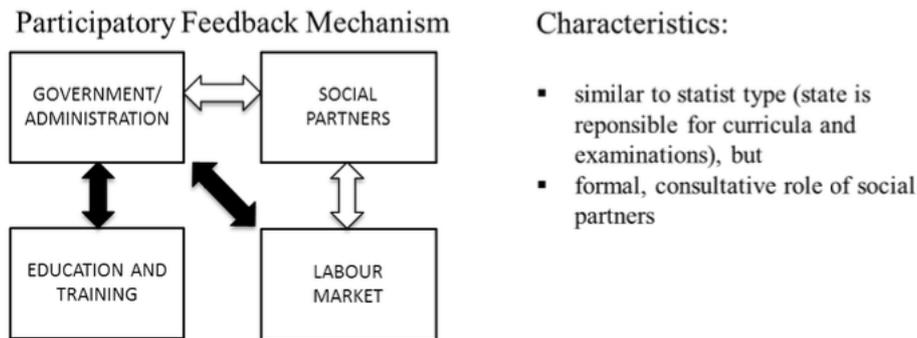


Figure 3: The participatory type of feedback mechanism and its characteristics

Source: Authors

Apprenticeship training (undertaken by less than one third of all VET students) is considered to be an integral part of IVET, while participation in VET in general is modest and only comprises approximately one third of the entire student population.

There are two IVET streams in France which can be distinguished. On the one hand, a ‘technological stream’ prepares students to go to higher technological education after the *technological baccalauréat* in order to obtain a degree at ISCED 5 level in two years in an *Institute Universitaire de technologie* (IUT) or in a post-baccalauréat class of a high school, *Section de Technicien Supérieur* (STS). On the other hand, a ‘vocational stream’ prepares students to enter the labour market either in two years after a *certificat d’aptitude professionnelle* (CAP), in three years after a vocational baccalauréat in a vocational high school (*lycée professionnel*) or through apprenticeship (Michel & Looney, 2015).

There are almost 200 specialities of CAP and around 80 specialities of vocational *baccalauréat*. These are defined and updated every five years by the public authorities in co-operation with trade unions and employers’ associations within so-called consultative professional commissions (*Commissions Professionnelles Consultatives* or CPC). Within the Ministry of Education there are 14 CPC corresponding to broad sectors of economic activity (for example: metallurgy, food industry, tourism), but CPCs are also run by other ministries. Each CPC has 40 members of four categories: ten representatives of trade unions, ten representatives of employers’ associations, ten representatives of public bodies and ten individuals selected for their specific expertise (*personnalités qualifiées*).² Each CPC is responsible for assessing the need for (new) qualifications, preparing qualifications including a lists of the subjects to be incorporated, outlining the structure and organisation of examinations and the preparation and dispatching of documentation to the Minister for National Education for approval (European Commission & Ecorys, 2010).

²<http://eduscol.education.fr/cid46815/nouvelle-architecture-des-cpc.html> (7.11.2016).

Although the French state has the leading role in the overall development of VET, the CPCs and the active role given to the social partners in the body play an increasingly important role in awarding national qualifications and the creation, updating and design of related referential standards for specific economic sectors. Nevertheless, this moderate influence of social partner on the renewal of VET provision needs to be distinguished from systems in which social partners are more or less in charge of the system, as we will see for the ‘coordinated model’ of feedback mechanism in the next section. Furthermore, it must be seen in the general context of national employment relations and governance which Saurugger characterises for France as follows: ‘French state authorities are generally much less enthusiastic about involving private interests in public policy formulation than their Austrian or German counterparts. The bureaucracy in countries characterized by statism, such as France regards the influence of interest groups as illegitimate. It has traditionally used its formal consultation process more as a way of gathering information than as an opportunity to incorporate organized interests.’(Saurugger, 2007, p. 122)

3.4 The Coordinated Model: Apprenticeship Training in Germany and Austria

The coordinated feedback mechanism is characterized by the decisive and far-reaching role of organised business and organised labour in the renewal processes of VET. Initiative to renew VET content typically comes from business interest organisations, with large employers as visible spokesmen in favour of a reform or from trade unions that are able to highlight specific issues and problems relating to the labour market. These demands are mediated by the social partners and expressed to the government in the form of proposals. The government then takes the formal decision on any change. The implementation of change again depends largely on the social partners who are responsible for major parts of the provision (e.g. apprenticeship places, training of trainers, assessment, etc.). For an illustration of the coordinated model of feedback mechanism see Figure 4, for a detailed representation for the German dual system see Figure 5.

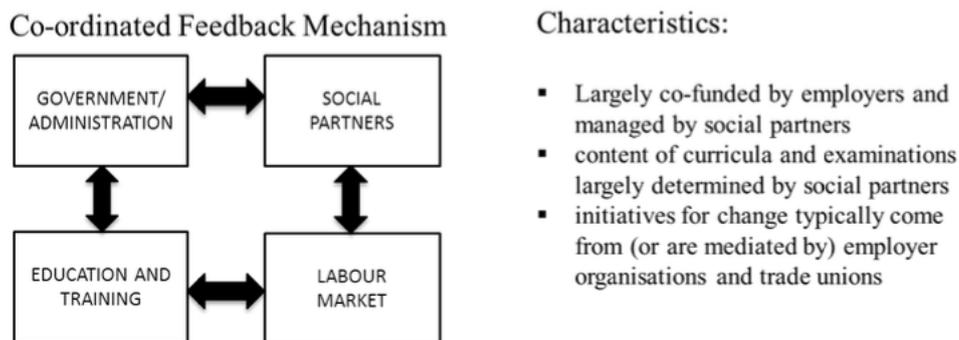


Figure 4: The coordinated feedback mechanism and its characteristics

Source: Authors

In Germany, the dual system, which combines company-based learning with learning in vocational schools, is the predominant form of education at upper secondary level. Around half of a youth cohort chooses each year one out of approximately 350 recognised training professions; some opt for full-time vocational schools, which are offered in various domains. Only roughly a quarter of a cohort continues their studies in the 'Gymnasium' leading to a general higher education entrance qualification (Autorengruppe Bildungsberichterstattung, 2016, p. 80). In addition, a growing part of graduates of academic upper secondary education enter dual VET after completion of this academic track (BIBB - Bundesinstitut für Berufsbildung, 2016, p. 161).

For apprenticeship training the vocational competences to be acquired are established in so-called training regulations (*Ausbildungsordnungen*), which are accompanied by a framework curriculum (*Rahmencurriculum*), developed in line with regulation for every recognised training profession. The motivation and initiative for an amendment to training regulations or development of new ones (together with the framework curriculum) usually comes from the social partners addressing one or several professions within a branch. The organisation and supervision of the renewal of training regulations is managed by the Federal Institute for Vocational Education and Training (*Bundesinstitut für Berufsbildung, BIBB*) on behalf of the federal government. The Standing Conference of the Ministers of Education and Cultural Affairs of the *Länder* (*Kulturministerkonferenz, KMK*) is simultaneously responsible for organising and supervising the framework curricula. (The Standing Conference unites the ministers and senators of the *Länder* responsible for education, higher education and research, as well as cultural affairs since the end of WWII.) Thus, the feedback mechanism of the dual VET system consists of two independent parts that work in parallel.

The development of the new training regulations and framework curricula takes approximately one year. There are three basic stages in developing new training regulations and framework curricula: the preliminary phase, where the social partner organisations have to come to a first agreement before contacting the competent ministries; the development and agreement phase, organised by BIBB and KMK; and the promulgation phase, with votes and control mechanisms before the official issuing of the new training regulation/framework curriculum. On the one hand stakeholders involved in these processes complain that the whole renewal process (from initial concept of an alteration to a training regulation to implementation) is too long and too slow to react to urgent labour market needs, as it can take up to two years and sometimes even longer. The time taken is caused by the involvement of a large number of committees, panels, boards or bodies that represent employers and employees in the preliminary phase. On the other hand, they see the involvement of a large number of committees, panels, boards and bodies that represent employers and employees in the preliminary phase as strength. Solving this paradox and mediating the needs of specific employers while at the same time ensuring that graduates can practice their occupation everywhere in the market is at the heart of the coordinated model.

In principle, the Austrian feedback mechanism for renewing occupational profiles in the Austrian apprenticeship system is very similar to the German one (Cedefop, 2013; Henkel & Markowitsch, 2005). The actual design of in-company curricula is primarily conducted by the tripartite Federal Advisory Board on Apprenticeship (*Bundesberufsausbildungsbeirat*). The Board is equally composed of representatives of the social part-

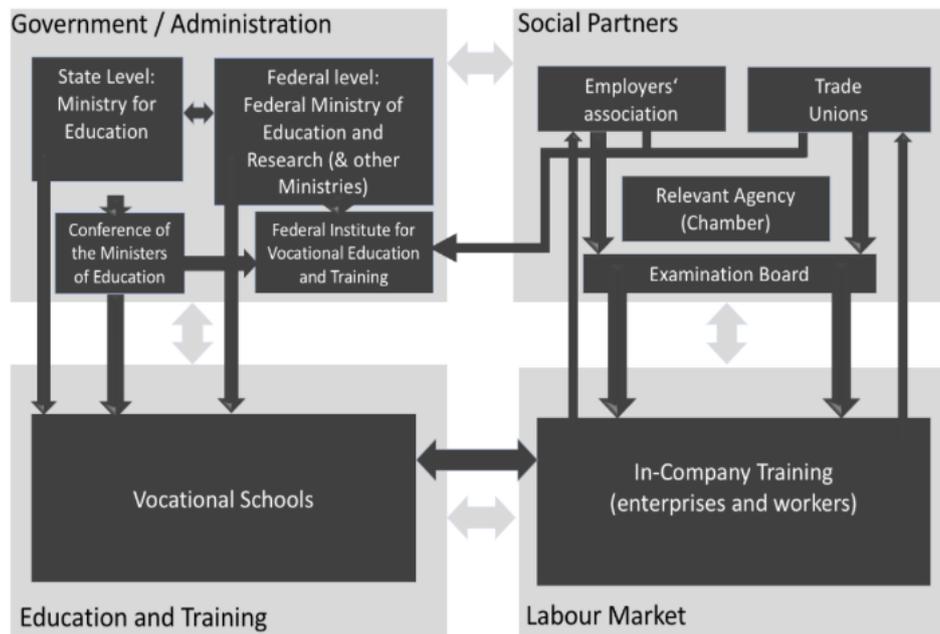


Figure 5: Feedback mechanism of the German dual system

Source: Authors, see also (Cedefop, 2013)

ners, i.e. six board members as well as one chairperson each proposed by the employers' and employees' organisation. Furthermore, the ministry of education appoints two consultative board members among VET teachers. The board's subcommittees or the educational research institutes of the social partners introduce proposals or draw upon expert opinion concerning reform proposals, e.g. on the introduction of new or modernisation of existing apprenticeships. These draft proposals are distributed to all relevant employer associations (including the public sector and other actors). Internal discussions are conducted and once consensus is reached the Board submits the proposal for official approval to the ministry of Economy, which is responsible for the company related part of the apprenticeship. As in the case of Germany the school part is administered in parallel by the ministry of Education, but this process is perceived by stakeholders as subordinated.

Although many commonalities can be identified between countries, which adopt this model and system of vocational training, there are also differences which make a comparison interesting. For example, there is a contrast between the stronger sectoral arrangements, which can be found in Denmark and the Netherlands in the form of (autonomous) trade committees or sector skill councils, and the influential umbrella organisations of chambers present in Austria and Germany. Rauner and Wittig (2013) also found remarkable differences as regards the degree of fragmentation and standardization for the apprenticeship systems in Austria, Denmark, Germany and Switzerland.

4 Discussing Feedback Mechanisms within the Scope of Cross-Country Comparative VET Research

The above descriptions of feedback mechanism operating in VET subsystems in England, Austria, France and Germany are only summaries of more elaborated case studies (see Cedefop 2013). Nevertheless, these cases allow to demonstrate four fundamentally different models of feedback mechanism by focusing on one crucial question: How is the content of vocational education and training in terms of qualifications, programmes and/or curricula renewed by the help of formal institutionalized mechanisms?

In the following, we summarise the four types of formal feedback mechanism and discuss them against the backdrop of selected typologies describing either the wider institutional environment of a form of political economy or the VET and skill formation systems. The four types foresee – a different number of – actor positions representing either ‘education’, the ‘labour market’ or the ‘state’ and enables particular ways of interaction between them (see Figure 1). All identified models allow for some exchange and thereby feedback between the education and training providers and the labour market, as illustrated, yet the roles of ‘government’ and ‘social partners’ work out differently in the mediation of the exchange. Clearly, the models presented in Figure 6, deliberately simplify existing arrangements, as one can see, for example, when comparing the formal feedback mechanism of the German Dual system (represented in Figure 5 above) with the generic representation of the coordinated model in Figure 4.

In the liberal model, the education and training providers collect and systematize the responses of both individual employers and future or former students. Consequently, they justify their provision and the programmes, curricular and taught canon vis-à-vis the (co-)funding ‘government/administration’ by the evidences collected. Moreover, given that they typically receive funding per study place and not a mere lump sum, they depend on the actual willingness of students (and enterprises) to rely on their services. The difficulty is that training providers need to respond to a strongly diversified demand, as patterns of organising work and thereby the skills demanded might know a high number of variations. It is important to note, that the government itself does not systematically review changing demands in the labour market, yet, rely on the information education providers submit as justification for updating their provision. In the ‘liberal’ feedback mechanism, the social partners have no say and therefore aggregated interests of either the employers or the employees are missing. In the case of VET in England, the absence of social partners reflects the weak position of organised labour and the non-existence of any strong interest organisations of the employers in many sectors. However, as the case of the liberal feedback mechanism in the Austrian university of applied science sector demonstrates, social partners’ influence could be marginal in a formal feedback mechanism even in countries, where they typically play a significant role.

The ‘statist’ model is characterised by strong state regulation of vocational education. Educational providers typically work within a closely out-spelled framework for their provision, yet, the formal feedback mechanism has no exchange with any labour market actors. The government/administration itself organises a review of changing market needs, applying varying techniques, and build their decisions on the update of VET provisions on the outcomes of research results and collected opinions. The ‘statist’

feedback

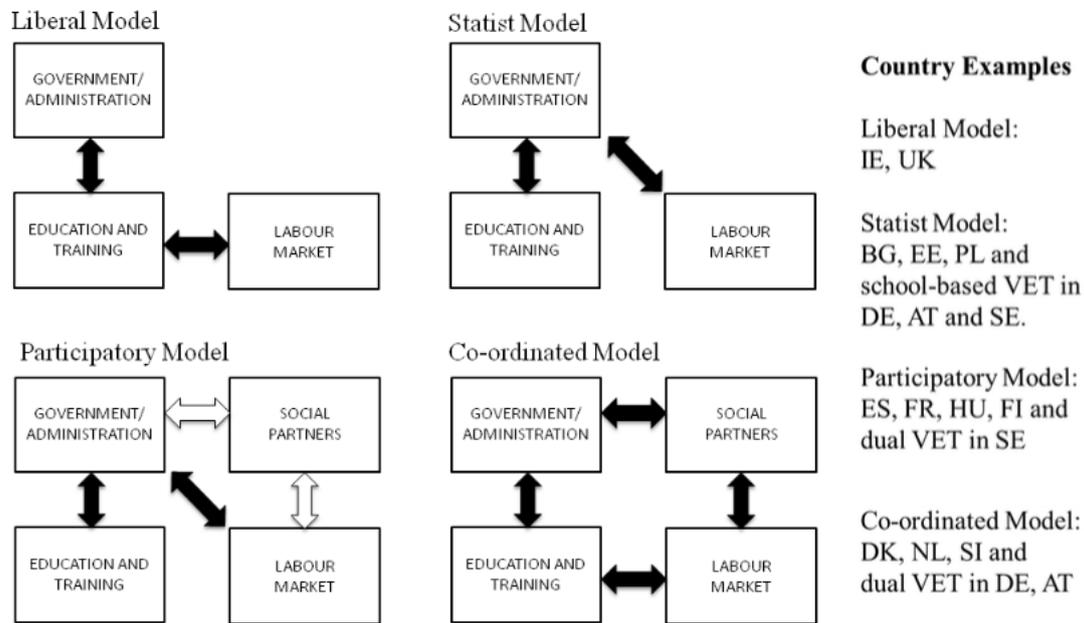


Figure 6: Main types of feedback mechanism identified in IVET systems in Europe

Source: Authors, see also (Cedefop, 2013); white arrows indicate the modest influence, while black arrows show main interaction

mechanism’ provides no space for the ‘social partners’ and thereby lack the benefits from social partner’s capacity of interest aggregation across a variety of enterprises and groups of employees and weak links between education and the labour market. A basic type of ‘statist’ feedback mechanism can be found most European countries. However, they are more likely to be found in systems, which clearly focus on state-regulated, school-based VET (e.g. Bulgaria, Estonia, Sweden, see Cedefop 2013).

The ‘participatory’ model follows closely the characteristics of the ‘statist’ model, yet, foresee a consultative role for the social partners. Organised interests could thereby articulate particular needs and reform proposals on a regular base and partake in the governance of the VET sector. However, their role remains limited when compared to the coordinated model, where the social partners effectively control key institutions in charge of providing VET and updating VET curricula. So, by simply adding the social partners voice, one cannot expect to achieve the particular strengths of a coordinated feedback mechanism. Besides France, the participatory model was identified for VET in Spain, Hungary and Finland.

In the ‘coordinated’ type of formal feedback mechanism, the social partners are the drivers of renewal processes. Typically, they are also partly responsible for the implementation of any reform of programmes, curricula or canon achieved. The social

partner's strong role relies on their capacity to aggregate diverging interests within their camps, i.e. organising the diverging interests of employers on the one hand, the diverging interests of various groups of employees on the other hand in a way, that meaningful compromises with regard to VET provision is possible. The outcome of the compromises, consequently, can make a difference in the sectors, for which they have been successfully negotiated. For the coordinated feedback mechanisms to work, a particular institutional environment is required, which is well captured by the concept of 'collective skill formation system' (Busemeyer & Trampusch, 2012). Besides the dual VET in Austria and Germany this model was identified for VET in the Netherlands and Denmark and to some extent also Slovenia.

How does the concept of formal feedback mechanism add to existing approaches of comparing VET or skill formation systems? What is its added value and what are the limits of the concept?

Firstly, formal feedback mechanisms are anything but invisible as often claimed for informal institutional or cultural processes. Despite their legal base, however, they escape the scrutiny even of experts on a particular VET system. As there are little traditions to describe them systematically and in a comparable, and tangible way, they remain outside the attention of the policy and research communities. By adopting a more structured approach in describing formal feedback mechanism, we can clearly describe the actors involved and processes implemented, leading up to the renewal of VET programmes, curricula or standards.

Secondly, approaches developed in the economic sociology of labour markets, the varieties of capitalism approach as well as comparative research on welfare state are useful in predicting whether particular VET systems are likely to be predominant. However, they do not provide an alternative in describing differences in VET systems. Not only because, they use VET as explanatory variable and are not interested in the difference of VET systems as such, but because they necessarily have to be wrong or inaccurate when describing VET, because they need to take a country's whole education system as research entity and do not acknowledge the difference between types of VET provision within a country. This leads to misinterpretation as for example by ignoring differences between VET in the French and Italian speaking part of Switzerland as pointed out by Gonon (2004) or as we have shown by ignoring the importance of school-based VET in Austria, which at least makes up half of overall enrollment in VET.

Thirdly, the concept of formal feedback mechanism is able to grasp constitutive elements of a VET system without extensive reference to traditional education system characteristics or an extensive analysis of the institutional environments. Moreover, by analysing formal feedback mechanisms in place, it is possible to demarcate where a VET sub-system ends and another VET sub-systems begins. In this sense research presented here also asks for new standards for comparative VET research as it suggests that entities to be compared are not countries' overall VET systems, but their potential sub-systems, and their particular formal feedback mechanism.

Table 1: Comparing the concept of feedback mechanism with concepts of skill formation and VET systems

Concepts	Skill formation regime (Busemeyer & Trampusch, 2012)	VET-System (Greinert, 2004)	Feedback mechanism
England	Liberal	Liberal	Liberal
France	Statist	Statist	Participatory
Germany	Collective	Dual	Coordinated
Austria	Collective	Dual	Coordinated (apprenticeship) Statist (school-based VET) Liberal (higher VET)

Source: Authors

So far, little comparable evidence is available on the degree of effectiveness of the various types of feedback mechanisms and its variations when implemented in different institutional environments. It can only be assumed that each type of formal feedback mechanism has its particular merits and shortcomings. Moreover, even in one country, the very same feedback mechanism may work for one particular VET field, yet fail in others. When listening to experts in the field, we got the firm impression that a feedback mechanism's specifications might not be able to guarantee the desired outcome, yet, that outcomes depends heavily on its implementation and the politics applied by the involved parties. It would be therefore no surprise that one and the same, yet, differently implemented and enacted feedback mechanism could create desirable outcomes in one case and poor ones in others. Moreover, institutional context matters and types of feedback mechanisms are likely to be complementary to particular other institutions, notably industrial relations. Yet, as the Austrian higher VET example shows, one type of formal feedback mechanism might work considerably well even in environments where it represents a kind of least likely case.

We have shown that formal feedback mechanisms in VET are a necessary and promising unit of research. However, more work is required to study the various mechanisms in a more detailed way, investigating their year-to-year functioning, studying their responses to changing political environments (composition of government), to the changing composition of cohorts of young people and their educational preferences, and to changing economic circumstances (structural changes in the economy; booms and busts in sectors or the economy as a whole). By extending our knowledge about the workings of formal feedback mechanisms, we could spell out better how today's advantageous characteristics of VET in many European countries could be preserved or even further improved over time. Only by 'staying in the loop' and renewing VET provision in the right ways and 'on time', VET can stay a promising option.

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The Experiences of Learners with Disabilities in Mainstream Vocational Training in Nepal

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Abstract

Context: This article explores the lived experiences of learners with disabilities who were attending short-term skills-based training programs in Nepal. The research questions addressed were how the learners with disabilities had been experiencing learning with their peers without disabilities and whether the vocational training was inclusive from the perspectives of learners with disabilities.

Approach: Based on a phenomenological design, eight learners with disabilities were purposively selected. In-depth interviews were held with the participants. Data were collected in the forms of audiotaped recordings, field notes, and institutional records. The thematic analysis technique was employed to explicate the transcribed data.

Results: The results showed that learners with disabilities faced difficulty in commuting to and from the training center. The physical learning environment was insufficiently accessible, and this affected the learning of students with disabilities. Although the learners with physical disabilities had no problem in understanding the subject matter taught in the mainstream classrooms, the learners with visual impairments and those who were with hard of hearing had, at times, difficulty in following their instructors. The learners with disabilities had trouble with socialization and with forming friendships though they had supportive instructors. The participants' statements revealed that the existing inclusion practices were not enough to address the needs of persons with disabilities. However, they viewed inclusion as a much better option to cater to the needs of differently abled people.

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Conclusion: Inclusive technical and vocational education and training (TVET) is in practice throughout the world. This qualitative research paper has presented the perspectives of learners with disabilities (LWDs) about the inclusive practices in the Nepalese TVET sector. More importantly, this study has given a voice to the LWDs from mainstream vocational training centers in Nepal.

Keywords: VET, Vocational Education and Training, Learners with Disabilities, Mainstream, Experience, Nepal

1 Introduction

Disability is a form of diversity (Dunn & Andrews, 2015), and inclusion is a way of bringing together and harnessing diversity (Arzola, 2008). Inclusion focuses on the needs of every learner and calls for respecting their differences (British Council, 2014). The right to an inclusive education demands that all mainstream educational institutions welcome all the learners and adapt their infrastructure and services to meet the needs of every learner (Cigman, 2010).

Many educators and disability activists agree that inclusion in mainstream educational institutes is the appropriate way to provide education and training to all kinds of learners (United Nations Children's Fund, 2003). Following the spirit of the World Declaration on Education for All (1990), the Salamanca Statement (1994), the World Education Forum (2000), and the United Nations Convention on the Rights of Persons with Disabilities (2006), Nepal started addressing the issue of the inclusion of persons with disabilities in education and training (Regmi, 2017).

In Nepal, the Council for Technical Education and Vocational Training (CTEVT), functionally under the Ministry of Education, has been working as the main agency to provide long-term and short-term TVET programs. The TVET policy of 2012 provides guidelines for systematizing TVET provisions in Nepal (Ministry of Education, 2012). The key policy areas are the expansion of TVET programs, inclusion and access in TVET, the integration of various TVET modes and pathways, and sustainable financing. CTEVT has been running its programs and services based on this policy. Apart from CTEVT, more than a dozen ministries and other non-governmental organizations also provide various kinds of TVET programs in the country.

In this context, this paper has explored the lived experiences of learners with disabilities who were undergoing short-term skill-based training programs in different vocational training centers. The research questions for the study were (a) how have the learners with disabilities experienced learning with their peers without disabilities in mainstream vocational training programs? and (b) are the existing mainstream vocational training programs inclusive from their perspectives?

2 Literature Review

2.1 Concept of Disability

There are numerous definitions of the term disability. The definitions vary based on their purposes and accordingly highlight different conceptual elements (Altman, 2014). The World Health Organization (WHO) provides a relatively more comprehensive definition of disability that it is an umbrella term for a person's impairments, activity limitations and participation restrictions (2001, p. 3). An impairment is a problem in body function or structure; an activity limitation is a difficulty encountered by an individual in executing a task or action; while a participation restriction is a problem experienced by an individual in involvement in life situations (ibid, p. 10).

The definition of disability varies from country to country as well. Different definitions may coexist side by side even within a country. In the context of Nepal, the Human Rights for Persons with Disabilities Act, 2017 has adopted the definition of disability as given in the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) - persons with disabilities include those who have long-term physical, mental, intellectual and sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others (International Labor Organization, 2016; Nepal Law Commission, n.d.). The Act has classified disability from two perspectives. The first classification is based on the nature of the problem and difficulty in the parts of the body and in the physical system:

- i Physical disability
- ii Disability related to vision
- iii Disability related to hearing
- iv Deaf-blind
- v Disability related to voice and speech
- vi Mental or psychosocial disability
- vii Intellectual disability
- viii Hemophilia
- ix Autism
- x Multiple disabilities

The second classification is based on the degree of dependency. They are as given below.

- i Complete disability: It is the condition where there is difficulty in carrying out daily activities even with the continuous assistance of others.

- ii Severe disability: It is the condition of having to continuously take other people's assistance in order to carryout individual daily activities and to take part in social activities.
- iii Moderate disability: It is the condition of being able to perform daily activities by self with or without taking other's support, if the physical facilities are available and if there are opportunities of training and education.
- iv Mild disability: It is the situation where taking part in regular daily activities and social activities by self is possible if there are no social and environmental obstacles.

This paper has followed the definition and classification of disability as given in the Act because it would help the researcher to find out the persons with disabilities and determine the type of their disability.

2.2 Empirical Studies

An exploratory phenomenological study was conducted to understand how children with disabilities experience their participation in mainstream schools in Portugal (Pereira, la Cour, Jonsson, & Hemmingsson, 2010). Participation in school activities is an important aspect of learners' inclusion in mainstream schools. The study revealed three forms of participation – equal participation, special task participation and onlooker participation – and one form of non-participation, in which the learners felt completely excluded.

A study of the experience of an inclusive school education for learners with disabilities (LWDs) in Nepal showed that the LWDs had been facing difficulties in learning due to a lack of adequate disability-friendly resources and infrastructure in the public schools (Save the Children Norway-Nepal, 2004). In addition to the inadequacy of support systems, the study revealed that learners with disabilities were experiencing difficulty in travelling to and from their schools.

Another study on the experience of children with disabilities (CWDs) in school settings in the context of Vietnam revealed that the CWDs' most important difficulties were related to learning facilities, empathy from their peers and barriers caused by the physical environment (Tran, 2014). The study showed that most of the respondents' understanding of disability was based on the medical and individual model. The CWDs were found to be dealing with the difficulties by trying to adapt themselves.

Borland and James (1999) conducted a case study exploring the social and learning experiences of students with disabilities in a UK university. Four areas were found to be most important for students with disabilities: disclosure, access, quality assurance and the moral basis of the institution's disabilities policy. It was found that the students were found to be asked to disclose information about their disability at different stages, but the information they provided was not properly utilized. Some of the students with disabilities had problems in accessing buildings and other physical infrastructures. They had problems with transportation and the use of equipment. Lip readers had problems watching the lecturer and taking notes at the same time. Students with visual impairments had difficulty reading the white boards. The quality assurance system was

not found to be robust from the perspectives of the students with disabilities. Although the university's policy regarding disabilities was based on the social model, most of the staff and students' views on disability was found to be based on the medical model of disability (Borland & James, 1999).

As friendship is an important aspect of inclusion, some studies have explored the friendship experiences of learners with disabilities. These studies have highlighted that physical inclusion does not necessarily lead to social inclusion. The students' experiences of friendship are shaped by the values, beliefs, and customs of the education system, staff, and students (Morrison & Burgman, 2009). Academic achievement seemed to facilitate the learners with disabilities identifying themselves as the accepted members of the class. One study has showed that students with special education needs (SEN) experience more loneliness at school (Bossaert, Colpin, Pijl, & Petry, 2012). Another study has also revealed that students with disabilities often experience difficulties in being accepted by peers and developing friendships (de Boer, Pijl, Post, & Minnaert, 2013).

2.3 Policy on Inclusive Education

Inclusive education, which has emerged since the early 1990s (Armstrong, 2008), is a key policy objective for the education of learners with disabilities in many countries (Lindsay, 2007). The declaration of the Salamanca Statement and the UN Convention on the Rights of Persons with a Disability (CRPD) both form an important basis for the start of inclusion policies across the world including Nepal (de Boer, Pijl, Post, & Minnaert, 2013). Accordingly, the government of Nepal has developed policies to provide inclusive education and training to all.

The new constitution of Nepal, which came into effect in 2015, has envisaged the right of citizens with disabilities to get free education up to the higher level. In addition, it has guaranteed the right of visually impaired citizens and citizens with hearing or speaking impairments to get free education through brail script and sign language, respectively (Ministry of Law, Justice & Parliamentary Affairs, 2015). The Education Act and the School Sector Development Plan (2016-2022) have focused on the inclusive education of students with disabilities. Although the government of Nepal is criticized for adopting the donor-defined concept of inclusive education (Maudslay, 2014), it has recently implemented the new inclusive education policy for persons with disabilities (Ministry of Education, 2016).

In the context of Technical and Vocational Education and Training, the government has been implementing the TVET Policy since 2012, and the government has highlighted access and equity in TVET (Ministry of Education, 2012). The government has started scholarship and incentive programs for learners with disabilities to increase their access to TVET.

2.4 Theory of Inclusion

The term 'inclusion' replaced 'integration' and is often contrasted with 'exclusion'. In its broadest sense, inclusion promotes the active participation of all regardless of race, ethnicity, caste, disability, gender, sexual orientation, language, socio-economic status, and any other aspect of an individual's identity that might be perceived as different (Polat, 2011). In the study of disability, inclusion means that people with and without

disabilities participate in an activity together and interact on an equal basis (International Labor Organization, 2013). In the educational setting, inclusion emphasizes the placement of learners who display one or more disabilities in age-appropriate classrooms together with needed accommodations and supports (Arzola, 2008). The aim of inclusion is to empower marginalized people to take advantage of opportunities (World Bank, 2013).

3 Methodology

3.1 Study Design

A phenomenological approach was adopted for the purpose of this study, as the researcher wanted to gain personal insight into the lived experiences of participants (Flood, 2010). The objective of phenomenology is to understand human experience (Dowling, 2007; Wilson, 2015). This study has explored the experiences of learners with disabilities who were undergoing mainstream vocational training.

3.2 Sampling

The study participants were purposively selected in this study. To be included in the study, the persons with disabilities must have been undergoing vocational training courses. Participants who voluntarily wanted to take part in the study were selected. The details of the participants are provided in Table 1.

Table 1: Information about Research Participants

Participants	Gender	Type of disability	Age	Caste/Ethnic group ¹	Training attended
Kapil	M	Hard of hearing	26	Brahmin	Building electrician
Renu	F	Blind	18	Hill Dalit	Knitting
Pushpa	F	Physical (short stature)	25	Hill Janajati	Beautician
Champa	F	Physical (leg)	30	Chhetri	Tailoring
Hari	M	Physical (hand)	23	Brahmin	Automobile mechanic
Khadga	M	Physical (leg)	23	Brahmin	Mobile repairing
Babita	F	Physical (leg)	32	Chhetri	Tailoring
Gita	F	Physical (leg)	20	Hill Janajati	Tailoring

¹The classification of caste/ethnic groups is based on the report 'Population situation analysis of Nepal' published by United Nations Population Fund in 2017.

Three male and five female participants took part in the study. They were attending different short-term vocational training programs. They were participating in the training at five different vocational training centers (VTCs) located in the Kathmandu valley. Two VTCs were government-owned and the other three VTCs were non-governmental. All the respondents were receiving the training at no cost to themselves.

3.3 Data Collection

The data collection involved in-depth face-to-face interviews to gain an understanding of the experiences of the learners with disabilities in mainstream vocational training. For this, semi-structured interview guidelines were prepared. Consent to carry out the study was obtained first from the management of the vocational training provider and then from the students with disabilities. In-depth interviews were held only with those students who agreed to participate in the study. Each in-depth interview lasted approximately 45 minutes and was audiotaped. The medium of communication between the researcher and the participants was the Nepali language. At least one face-to-face meeting was held with each participant even after conducting the in-depth interviews in order to maintain rigor in the study. The prolonged interaction with the participants helped to collect the detailed (thick) and comprehensive descriptions.

Data for this study were also collected in the forms of field notes and institutional records. The field notes were made before, during and after the in-depth interviews. The information provided by the vocational training provider in the form of institutional records helped me to understand the context even better.

3.4 Explication of the Data

A considerable amount of time was spent repeatedly listening to the recordings and transcribing them in Nepali. The field notes were repeatedly read and converted into fuller texts. All the transcribed data obtained from the in-depth interviews were then translated from Nepali into English with the help of an English language expert. The thematic analysis technique was employed to analyze the data (Braun & Clarke, 2006). The transcripts were read several times to analyze the narrative threads, tensions, and themes that emerged. Bracketing and peer debriefing techniques were adopted to minimize my personal biases in the study. Pseudonyms were used in the presentation to protect the participants' anonymity.

4 Results

With regard to the first research question, three themes appeared while analyzing the data: teaching-learning process, access to VET, and inclusion by other students and teaching staff.

4.1 Teaching-Learning Process

The participants' experiences about the teaching-learning process revealed three sub-themes: feeling of being a minority in the mainstream, collision between teaching style and learning style, and insufficiently disability-friendly learning environment.

Minority in Mainstream Classroom

The learners with disabilities formed a minority in the mainstream classroom. In all the cases, the learners without disabilities outnumbered the learners with disabilities. In most of the cases, there was only one learner with disability in the classroom. Gita (a 20-year old female learner with a physical disability who was attending the tailoring training) said that she was worried in the beginning of the training because she thought that people would treat her differently in the group. Sharing her jittery feelings, she said:

I felt uneasy in the beginning of the training. I used to think that there would be people without disabilities. I thought I was the only person with a disability in the group. I was worried what other people would say about me. Later, I knew that there was another sister with a physical disability. Then, I felt I found my friend.

Collision between Learning Style and Teaching Style

The learners with disabilities had mixed feelings about their teachers' teaching style. Those learners who had a physical disability said that they did not have any difficulty in understanding the subject matter that was taught. However, some of them had difficulty in performing the tasks. On the other hand, those learners who had visual and hearing impairments had, to some extent, difficulties in understanding the subject matter taught. In this connection, Renu (an 18-year old female learner with a visual impairment in the knitting training) expressed:

I frequently hear our instructor saying "yi yaslai yasari chhiraunu parchha"² and "aba yaha yaso garnu parchha"³. Since I cannot see the things, I have difficulty in understanding the subject matter being taught.

Kapil (a 26-year old male learner who is hard of hearing in the building electrician training) also had difficulty in following his instructor. Since he was hard of hearing, I communicated with him in writing. With regard to the teaching style of the instructor, one excerpt of our written communication follows:

I: Do you need additional support to learn? If yes, what kinds of support do you need?

Kapil: My friends without disabilities might understand from the teacher's speech. However, I have difficulty in hearing, so I have to observe things.

²A Nepali sentence meaning 'It should be inserted here in this way'.

³A Nepali sentence meaning 'Now you have to work here in this way'.

I learn things from drawings and visual materials. I learn the skill through observation. If there are visuals in the class, I find it easy to learn. Generally, I sit on the first bench so that I can clearly observe what the instructor is doing.

I: Can you lip-read with your instructor?

Kapil: Yes, I can. But I have to be facing the instructor at a close distance. But instructors keep on moving around the classroom. They don't always stand in front of me to speak.

Learners with physical disabilities had no difficulty in following their instructors as they could see and hear. However, they had to some extent difficulty in performing the tasks. For example, Pushpa (a 25-year old female learner with short stature in the beautician training) had difficulty in performing some tasks such as threading eyebrows and cutting hair. Her instructor used to provide her with a stool to stand on so that she could perform such tasks.

Insufficiently Disability-friendly Learning Environment

The participants expressed that the learning environment could have been made more accessible. The participants with impaired legs had difficulty in accessing the classrooms that were upstairs. They also had difficulty in using the toilets. Khadga (a 23-year old male learner in the mobile repairing training) had a physical disability. He walked with crutches. However, his class was on the second floor of the building. He had to climb up the stairs on crutches. He expressed his difficulty while undergoing the training:

Although I can reach the class with some difficulty on crutches, it is not accessible for wheelchair users. Moreover, the toilet is not accessible for persons with a physical disability. There is a toilet with a squatting pan. People such as me can hardly sit on such toilets. Moreover, the bolt is on the top of part of the door. Therefore, it is difficult to close the door of the toilet.

Champa, Babita and Gita had similar views with respect to the physical infrastructures of their training centers. Kapil (a 26-year old male learner with a hearing impairment in the building electrician training) had a different experience. Because of the lack of clear instruction, he got electric shocks for a couple of times. He added:

The place where I had to perform the practical activities did not have clear instructions about safety. Because of the lack of clear instructions, I got electric shocks a couple of times. Then, I became very conscious of following the instructions. I started asking for such instructions from my instructors before performing a new task.

Babita (a 32-year old female learner with a physical impairment in the tailoring training) shared another kind of experience. She had to come to the training center and leave her

baby at home. She said that she could have brought the baby with her if there had been a child care unit. She added that other female learners who had small babies could join the training if there was a child care unit.

4.2 Access to VET

Most of the participants expressed that they had difficulty in accessing the vocational training center. They shared their experiences of difficulties in travelling to and from the training center.

Difficulty in Commuting to and from the Training Center

Almost all of the learners faced difficulties in travelling to and from the training center. They clearly expressed that their learning was affected by their worries and anxieties regarding reaching home safely from the training center. Renu (an 18-year old female learner with a visual impairment in the knitting training) travelled from her residence to the training center partly on foot and partly by bus. She said:

I come to the training center by bus. I have to walk for about five minutes from my room to the bus stop. After getting off the bus, I have to walk again for a similar distance from the bus stop to the training venue... at Anamnagar⁴. Now I can travel alone with the help of a cane... While travelling by bus, I request the “khalasi”⁵ to manage a reserved seat for the PWDs... The public vehicles sometimes do not stop for people like me. Those “gadiwala”⁶ feel irritated because they have to help us get on the vehicle, manage seats for us, and help get off their vehicle.

Babita (a 32-year old female learner with a physical disability in the tailoring training) used to travel a long distance every day. She had an impaired leg. She shared her difficulty in travelling to and from the training center:

I come here leaving a small kid at home. I live in Budhanilkantha⁷. I have to change two buses to come here from my home. The public buses are generally overcrowded during office hours. Moreover, we sometimes have to suffer through terrible traffic jams. It’s very difficult to get a seat. Although there are reserved seats for persons with disabilities, such seats are often occupied by persons without disabilities. Most people without disabilities leave their seats when they see me in front of them. However, some people do not readily leave the seats... I have come here from Budhanilkantha standing in the aisle of a bus two/three times. I stood on the bus thinking that I would not die. My worries are how to arrive at the training center and then safely reach home.

⁴A place in Kathmandu.

⁵A Nepali term to referring to a helper in public vehicles.

⁶A Nepali term to referring to individuals who own the vehicles or who work in public vehicles such as drivers and their helpers.

⁷A place in Kathmandu.

Kapil and Hari had also said that they had difficulty in reaching the training center and going back home. Travelling to and from the training center was perceived as a major stress inducing factor by the participants.

4.3 Inclusion by Other Students and Teaching Staff

The participants' expressions constituted another major theme about the behaviors of students without disabilities and teaching staff. This theme covered three sub-themes: difficulty in socialization with peers, sympathetic friends, and positive as well as ambivalent feeling towards instructors' behavior.

Difficulty in Socialization with Friends without Disabilities

One of the participants had a bitter experience learning with friends without disabilities about socialization with friends without disabilities. Pushpa (a 25-year old female learner with short stature who was attending the beautician training) shared her experience:

I am the only person with a disability in the group. Sometimes, I feel a little bit lonely. My classmates have their own cliques. At the break time, they go for snacks in their own groups. I tried to join them a couple of times. But I felt that they did not like me. Although they did not say anything offensive to me, they used to avoid me indirectly. When I asked them to go for snacks, they used to give different excuses for being unable to go with me. Then, I felt I was not welcome in their circle. Therefore, I started going for snacks alone... I do not say anything to anybody. I have realized that I have to concentrate on my own tasks.

Sympathetic Friends

Some participants stated that their friends without disabilities treated them sympathetically. The learners with disabilities perceived that some of their friends without disabilities exhibited compassion and concerns for their sufferings and difficulties. Babita (a 32-year old female participant with a physical disability in the tailoring training) said:

One day, I arrived late to the classroom due to a traffic jam. I entered the class and clarified why I was late to my instructor. Some of my friends said "bichara"⁸. I felt uneasy. I thought anyone can be the victim of the traffic problem. They do not say bichara to others, but why do they call me so? However, I said nothing at that time.

Positive as Well as Ambivalent about Instructors' Behavior

Most of the participants felt that their instructors were very friendly and supportive. They perceived their instructors' behavior as caring. Babita (a 32-year old female learner with a physical disability who was attending the tailoring training) said:

⁸This word is used to show sympathy to those who are helpless or poor. Some people accept it easily, and some may feel they are being undermined.

The instructors are very friendly. They are very supportive. In the beginning of the training, they said that all the participants were equal in the classroom. They have behaved equally to all. People used to say that the instructors were very strict. But, I have never felt like that.

However, two participants had different opinions about the behavior of their instructors. Gita (a 20-year old female learner with a physical disability in the tailoring training) was in a quandary about her instructors' behavior. She said:

We are receiving the training for free. There is another group of ladies that pay for the training. Both training events are running simultaneously. The instructors are the same. If one instructor is in our group, another instructor will be in the other group. I personally feel that they care more about the paying group than ours. Actually I do not mean to say that my instructors have behaved badly towards me. They have never done so to me. They are supportive. However, they provide more time to the other group.

Hari (a 23-year old male participant with a physical disability in the automobile mechanic training) said that their training center had abundant resources. He expressed that the instructors were like friends. He perceived that his friends were not serious about their learning. Although the instructors were very friendly, they sometimes arrived late or left sessions early. None of Hari's friends complained about the instructors' behaviors. Once, his instructor left early. Hari's friends then closed the door and started playing cards in the classroom. He was the only person who did not like that and did not participate in the game. Here follows an excerpt from the in-depth interview with Hari:

I: Then, didn't you complain about the behaviors of your friends and instructors?

Hari: No, I could not.

I: Why?

Hari: The instructors are the employees of the training center. Nobody can do anything to them. They are "thulabada"⁹ and "pahunchwala"¹⁰ people. I thought there was no point in complaining about the instructors.

I: What about your friends?

Hari: Most of them are the local people. I think they are not serious in their learning. They come to the training center just to pass the time. Even the instructors are aware of the misdeeds of the learners.

I: Why don't the instructors do anything about them?

Hari: The training is just for six months. After that, the learners will leave the place. The instructors might have thought of tolerating their misbehavior for some time. "Murkha ka aghi daiba dara"¹¹. That's it.

⁹A Nepali adjective that denotes people belonging to a high class or positions with power

¹⁰In the Nepali language, people who have access to powerful people are called pahunchwala.

¹¹A Nepali idiom that literally means even the god is afraid of the fool.

4.4 Inclusion from the Perspectives of Learners with Disabilities

With regard to the second research question, the participants expressed their views on the existing inclusion practices in the mainstream vocational training programs. Three major themes appeared while analyzing the data: supporting mainstreaming and inclusion, struggling for inclusion, and way forward.

Supporting Mainstreaming and Inclusion

Pushpa and Khadga were associated with organizations that provide aid for the persons with disabilities. Other participants were not associated with any such organizations. Comparatively, Pushpa and Khadga more strongly supported the idea of mainstreaming and inclusion as they had been advocating for such concepts. All the participants supported the inclusion of learners with disabilities in mainstream vocational training.

Pushpa (a 25-year old female learner with short stature in the beautician training) was pursuing a bachelor's degree in education. She emphasized the importance of vocational training for the persons with disabilities. According to her, it would help people to be self-reliant, as it is intended to help the learner get employed. However, she did not believe there was full inclusion of persons with disabilities in the vocational training sector. During the in-depth interview, she shared one bitter experience about inclusion:

I visited some other training centers to help some of my friends with disabilities during the training. However, some of the people who worked in those training centers told me that the vocational training programs were suitable only for people without disabilities. They said the learners in vocational training had to perform tasks, which would be difficult for the persons with disabilities. This type of negative attitude towards the persons with disabilities is still in place. We have the challenge of breaking this pattern of thinking. Only then will there be an inclusive learning environment for the persons with disabilities.

Khadga (a 23-year old male learner with a physical disability in the mobile repairing training) was doing a bachelor's degree. He was associated with some organizations that advocate for the persons with disabilities. He strongly supported the idea of inclusion for PWDs in vocational training. He said:

I think two things are to be considered when including the persons with disabilities in the vocational training programs. First, we need to match the vocational training with the type of disability of the candidate. For example, I have taken mobile repairing training as it can be done sitting on a chair. This training is also suitable for wheelchair users. The training programs such as off-season vegetable farming and building electrician are less appropriate for me. Persons with visual impairments can be included in music training. A second thing to consider is the severity of the disability. People with the same kind of disability again differ in terms of the severity of the disability. So, mainstreaming and inclusion should not be understood as just

mixing up all kinds of people together. It's about discovering the individual's potential and placing the right person in the right place.

Struggling for Inclusion

Champa (a 30-year old female learner with a physical disability in the tailoring training) said that she got information about a vocational training provider who was providing free tailoring training targeting the disadvantaged groups of people. Then, she applied for the training. The vocational training provider held interviews with the applicants and selected the participants for the training. Champa was not in the published list of participants. Then, she went to the administration and complained that they did not include any of the persons with disabilities in the list. She argued with the administrative personnel. They decided to include her and publish an amended list. She further added:

I had to quarrel with the administration to convince them that they had to include persons with disabilities. I warned them that I would pass this issue on to the concerned bodies. Only then were they willing to accept me. If I had not spoken strongly, I would not have gotten the chance to attend the training. . . Although the government has rules and regulations to provide such opportunities to persons with disabilities, the employees at the training centers sometimes give preference to their friends and relatives.

Way Forward for Inclusion

Gita (a 20-year old female learner with a physical disability in the tailoring training) felt that her instructors provided more assistance to the participants in the groups that paid fees in contrast to her subsidized group. However, she had a positive point to make about the existing inclusive practices. She stated:

There is another person with a physical disability in my class. I have seen other people with disabilities in other trades. I think it is better to teach learners with and without disabilities together. However, there are many things that need to be done to make it fully inclusive. For example, arranging classrooms in the accessible places and providing disability-friendly toilets. . . We have to be optimistic. Things are gradually changing. . . not as we expected. Things are happening at a snail's pace.

Babita (a 32-year old female learner with a physical disability in the tailoring training) and Kapil (a 26-year old male learner with a hearing impairment in the building electrician training) made some similar points. First, they said that the learners with disabilities would not feel segregated and different if they were taught in the mainstream learning environment. Second, inclusion would work better if the learners' level of understanding and potential were identified before forming the training groups.

5 Discussion

This article explores the experiences of learners with disabilities who were in mainstream vocational training programs in Nepal. The vocational education and training (VET) is

a powerful tool for fostering social inclusion (Nilsson, 2010) and inclusive VET leads to the creation of a more inclusive society (Ferrier & Smith, 2010).

The learners with disabilities constituted a minority in the mainstream classrooms. This work relates to the minority group model of disability. The UN Convention on the Rights of Persons with Disabilities also designates persons with disabilities as the world's largest minority (Kanter, 2015). Social minorities have been systematically discriminated against in all areas of life (Bickenbach, Chatterji, M, & Ustun, 1999; Ralston & Ho, 2010). Gita's account also shows her fear of the possibility of being oppressed because of being a part of minority in a mainstream classroom. She feared being marginalized and oppressed. According to Holt (1995), most child learners are afraid of the mockery and contempt of their peer group. Although Gita was not a child anymore, her account supported Holt as she was afraid of what her peers would say about her.

Babita and Gita, who were attending the same vocational training, perceived the behaviors of their instructors differently. Babita was happy with her instructors. She said her instructors' behavior was better than she expected. She was 'delighted' with the service of the instructors (Oliver, Rust, & Varki, 1997). Gita, on the other hand, was not satisfied with her instructors' behavior. From the perspective of equity theory, if individuals perceive that they have less than others, they feel injustice and are demotivated (Fadil, Williams, Limpaphayom, & Smatt, 2005; Bolino & Turnley, 2008). Gita compared her instructors' support and the time they devoted to her group to that of another group. She felt that her instructors provided more time and support to the other group. It caused a feeling of injustice for her. Thus, she was not satisfied with her instructors' behavior. It might have impacted on her motivation to learn.

Hari's account revealed that Max Weber's concept of social hierarchy and power (Haralambos & Holborn, 2008) prevented participants from complaining about the instructors' behavior. The learners suppressed their dissatisfaction with the instructors who were higher in the hierarchy than they were and so were perceived as having greater power. The instructors did not complain about the behaviors of their participants because those learners were the children of local people. Most of the instructors and employees of the training center were from outside of the valley. They remained silent against the power of the local people.

Pushpa felt that she was different from mainstream learners who were without disabilities. She was the only person with disabilities. She sensed that her classmates indirectly avoided her; they did not want to be her friends. She wanted somebody to share her feelings with and keep her company. In the in-depth interview, she states that no one liked to be with her. She felt powerless and dependent because of the 'alienation' (Haralambos & Holborn, 2008).

The social interactions between learners with disabilities and their peers can be regarded as the most essential dimension of social participation. Feeling accepted by peers and having friends is important in creating a positive learning experience. According to Shakespeare (2006), friendship is important for emotional, practical and even medical reasons. Pushpa's experience of having difficulty in being accepted by peers and forming friendships is supported by a number of studies (Bossart, Colpin, Pijl, & Petry, 2012; de Boer, Pijl, Post, & Minnaert, 2013; Garrote, Dessemontet, & Opitz, 2017). These

studies found that children with disabilities were at risk of experiencing difficulties in their interactions with peers at school. Therefore, mere enrollment in mainstream classrooms was not enough to support the social participation of learners with disabilities. The study showed a need for interventions to enhance the social participation of learners with disabilities in the mainstream classrooms. Although the study was based on children with disabilities, Pushpa's account shows that it is true for adult learners with disabilities as well.

Although the learners with disabilities may have a greater need for friends, they are less likely to be well integrated into networks and friendship circles (Shakespeare, 2006, p. 170). In the context of VET, studies have shown that low levels of social support function as an obstacle in completing the course (Polidano & Mavromaras, 2011).

Most of the participants' statements revealed that they had sympathetic friends. Some of them perceived that their friends had thought of persons with disabilities as helpless objects of pity. It was the reason behind referring to them with the term *bichara*. It shows that thinking of their friends without disabilities was guided by the charity model of disability – viewing persons with disabilities as victims deserving pity (International Labor Organization, 2016). However, people such as Babita did not like such an emotional expression based on sympathy. They adhered to the paradigm shift of moving from charity to investment, from sympathy to rights, and from exclusion to inclusion (Lamichhane, 2015). They prefer to be treated as differently abled people.

Kapil's difficulty in performing lip reading and note taking simultaneously showed that his instructor's teaching style was not compatible with his individual learning style (Borland & James, 1999). Renu's difficulty in understanding her instructor's statements, which included many pronouns, also exhibited a mismatch between the teaching style and the learning style. Learning becomes effective when the instructor's teaching style matches the learner's learning style (Kolb & Kolb, 2012). In this connection, Vorhaus (2010) presents more than 71 models of learning styles and summarizes the learning styles of the Vocational Education and Training (VET) learners: In general, they are more visual than verbal, they prefer to watch and see rather than read and listen, they prefer to learn by doing and by practicing, they prefer learning in groups with instructor guidance, and they prefer to have a clear understanding of what is required of them. According to Ferrier and Smith (2010), many teaching staff at VET institutions do not have the required knowledge and skills about effective and appropriate teaching practices and other instructional strategies to support the students with disabilities. This study thus shows the need for mainstream classroom instructors to consider the learning style of individual learners.

The participants had difficulty in commuting to and from the training center. Although the government had provided persons with disabilities with free of cost vocational training programs, learners with disabilities had difficulty reaching the training centers. This study result is analogous to the findings of Save the Children Norway-Nepal (2004). Likewise, Malle, Pirttimaa, and Saloviita (2015) report that lack of transportation and adaptive educational materials or facilities in the training institute are the major barriers in the full and effective inclusion of students with disabilities in formal vocational education programs.

The participants' concern about accessible infrastructure relates to the rights-based

approach to disabilities. The right to equal access means that all members of the public should have equal access to facilities and resources open to the public (Williamson, 2015). It implies that the problem is not in the impairment or the body but in the social structures (Save the Children Norway-Nepal, 2004). In this connection, the Asian Development Bank (2014) states that the vocational training providers in Nepal are mostly under resourced and insufficiently disability-friendly although the short-term skills training for disadvantaged groups such as PWDs is expanding in the country.

The insufficient accessibility of learning environment, as described by the participants, has illuminated a gap in the inclusion of learners with disabilities in the vocational training sector (Tran, 2014). Inclusion is about a person's right to belong to her/his local mainstream educational institution, to be valued for who s/he is and to be provided with all the support s/he needs to thrive (Rieser, 2006). It is based on the principles of equality, equitable access, full participation, human dignity, and the acceptance of and respect for diversity (Kaffe, 2002). It is more than being at the same event, seeing the same thing, hearing the same thing, and doing the same thing. It is about people with and without disabilities experiencing the same thing at the same time, sharing in that experience and respecting others (Jordan, Carlile, & Stack, 2008; International Labor Organization, 2013).

The results show that the participants associated with organizations working for the PWDs strongly supported the idea of mainstreaming and inclusion. However, some of them had stereotypical understanding about the training or jobs for those with disabilities. Khadga's statement about inclusion is encouraging the placement of persons based on their disabilities, not their abilities and interest. This stereotypical understanding of training or jobs for those with disabilities perpetuates exclusion in another way (International Labor Organization, 2016).

The learners with disabilities were in agreement about the inclusion of PWDs in mainstream vocational training. In the course of in-depth interviews, they even shared their bitter experiences of exclusion. From their statements, we can gather that some people still believe that technical and vocational training programs are only for persons without disabilities. However, the participants were optimistic about to have easily accessible and fully inclusive vocational training centers in the future.

6 Conclusion

This study attempted to give voice to learners with disabilities in mainstream vocational training centers. Their experiences of learning with persons without disabilities and their views on inclusion practices have reflected the existing situation of inclusion in the vocational training sector of Nepal. To make the training and educational systems more inclusive, most of the developed countries have revised their educational policies based on international statements, devised inclusive pedagogies, devised school structure to meet the needs of learners with disabilities, improved teacher training, and enhanced parental involvement (Srivastava, de Boer, & Pijl, 2015). This study has found a gap between existing inclusive educational policies and the practice in Nepal.

Although this study selected learners with different kinds of disabilities, further research can be conducted on the experiences and perspectives of learners with a particular type of disability. This study brought forward the stories of learners with disabilities in the mainstream vocational training setting. Further research can be conducted on the experiences of instructors who have been teaching in mainstream classes. Such research would help us to better understand the circumstances experienced by persons with disabilities in the TVET sector of Nepal.

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Biographical Note

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Book Review: Collective Skill Formation in Liberal Market Economies? The Politics of Training Reforms in Australia, Ireland and the United Kingdom

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Book Review

Collective Skill Formation in Liberal Market Economies? The Politics of Training Reforms in Australia, Ireland and the United Kingdom, by Janis Vossiek, Peter Lang, Bern/Switzerland, 2018, 226 pp., ISBN 978-3-0343-2969-9 (paperback) about 66€, ISBN 978-3-0343-2971-2 (e-pub) about 74€, ISBN 978-3-0343-2970-5 (PDF) about 74€.

The book was published as the 16th volume of the series *Studies in Vocational and Continuing Education*. Series Editors-in-Chief are Philipp Gonon and Anja Heikkinen. Janis Vossiek is a post-doctoral researcher at the School of Educational and Cultural Studies of the University of Osnabrück, Germany.

Purpose

The monography is based on the author's doctoral dissertation. An introductory chapter is followed by the outline of the theoretical framework for the study. At the heart of the volume are the three case study chapters on the United Kingdom, Ireland and Australia

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which all contain a brief summary of the country-specific findings. The latter are drawn together for a cross-country comparison in the conclusion.

The purpose of the book lies in expanding the academic discourse on collective skill formation regimes to the realm of liberal market economies, with the aim to contribute to advancing the underlying theoretical assumptions of institutional political economist research on Vocational Education and Training (VET). In addition, Vossiek's study focuses on issues evolving around institutional change in VET regimes during later stages of their *evolution* as compared to skill formation literature more interested in the *genesis* of relevant institutions. With a view to explanatory variables the book combines a concern for patterns of economic coordination as put forward by literature on Varieties of Capitalism (VoC) with one for partisan politics and therefore goes beyond the firm-centered perspective of existing VoC-research.

Content

Vossiek's book starts off with situating the contribution among research on dual apprenticeships. His take on this topic is shaped by the growing body of literature on Vocational Education and Training (henceforth VET) by scholars identifying as institutional political economists. Conceptually, the author draws on Busemeyer and Trampusch's (2012) work on collective skill formation as well as contemporary comparative capitalism research, specifically Hall and Soskice's (2001) Varieties of Capitalism (VoC) approach.

Vossiek draws attention to the fact that collective skill formation is commonly thought of as the reserve of coordinated market economies (CMEs) in which the collaboration between key political actors- vital in sustaining apprenticeships- is likely to be facilitated by relevant institutional arrangements. Due to their reliance on market-driven mechanisms and hierarchies, stakeholders in liberal market economies (LMEs) are less likely to engage in coordination. LMEs are often burdened with a history of VET being sharply contested between capital and labor and reluctance of the state to mediate, which lowers the prospects for collective governance of VET and has contributed to weakening apprenticeship provision.

By studying the skill formation regimes of Australia, Ireland and the United Kingdom, all of which are liberal market economies, Vossiek challenges this state of research and finds that LMEs, too have the propensities for VET that is rather more collective than suggested by previous findings. The author's research is driven by three central questions. The first one centers on the different traits of collective skill formation in the three LMEs, on whether reforms have led to institutional change that led to skill formation either being more or less collective afterwards. Secondly, Vossiek seeks explanations for diverging paths with regard to collective skill formation in the face of similar outsets in the three countries observed. The focus here is on coalitions between key stakeholders in VET- in the case of this book this means partisan governments and organized capital and labor- and reasons for reforms. The third question is about the implications of Vossiek's work for research on VET and institutional change.

The theoretical approach employed by the author builds on existing research by institutional political economists, the body of literature to which Vossiek aims to contribute.

This means on the one hand building on the merits of contemporary comparative capitalism research, above all the aforementioned VoC-approach but challenging VoC's conceptualization of skills, its neglect of the historicity of institutions and its take on institutional stability and change. On the other hand, scholars of institutional political economy commonly employ a historical institutionalist lens through which explanations for similarities and differences between VET systems are developed. In Vossiek's case the main threads of the analytical framework are the following: it is assumed that cross-class coalitions are important for sustaining apprenticeship systems or for moving closer towards a collective VET regime; the expectation that partisan politics are central for the nature of policies relevant to VET and for determining the relationship between VET stakeholders and between the latter and the government; the presumed relevance of path-dependency with regard to reforms in the political arena of VET.

Data for the book has been generated by conducting several dozens of expert interviews with relevant VET-stakeholders in Australia, Ireland and the United Kingdom. In addition, the author has analyzed secondary literature on the three cases as well as primary sources. Methodologically, Vossiek has engaged in process tracing, one of the most prominent tools applied in historical institutionalist research. The analysis spans roughly forty years, starting in the 1960s and ending in the first decade on the 21st century.

A central finding of the book is that there are indeed marked differences within the group of liberal market economies as far as the politics of VET are concerned. Vossiek ably demonstrates that the United Kingdom has in fact moved further away from a collective skill formation regime while Australia, and Ireland even more so, have moved closer to it during the decades under study. The divergence between the three cases, despite similar conditions up until the 1960s, is explained by referring to the different governmental constellations and, consequently, the different nature of reforms implemented or attempted in the face of economic crises. While Australia and Ireland have resorted to facilitating collaboration and compromise between key political actors- particularly organized capital and labor- the United Kingdom has opted for policies much to the detriment of collectivist solutions, essentially focusing on excluding organized labor from the political arena of VET. At the same time, successive attempts to overcome more voluntary forms of firm involvement in VET have failed in the UK as reforms did not lead to changing the preferences of firms, thus institutional change did not occur. In contrast to this, the author posits that in Australia and Ireland, the implementation of policies promoting cross-class collaboration in VET was closely linked to finding consensus in the realm of industrial relations as well, thereby ensuring a broader basis for more sustainable capital-labor-coalitions. These diverging trajectories are explained by pointing to the differences between non-right-wing (Australia, Ireland) and right-wing (UK) governments concerning the skill formation agenda. A prerequisite for realizing these agendas, Vossiek finds, were economic crises that served as a backdrop and as the legitimization for pursuing the one or the other strategy.

Hence, the other key insight the book is providing is that patterns of economic coordination alone cannot sufficiently explain differences between countries regarding their approach to VET. If this were the case than the puzzle of a collectivist turn in Australia

and Ireland until the mid-1990s would remain unsolved. Consequently, Vossiek argues and shows that political coordination matters, too.

Conclusion

The central merits of Vossiek's contribution are that firstly, it has carried collective skill formation into the realm of liberal market economies. While providing insights from these least likely cases is first and foremost geared towards theory building, looking at collective skill formation in LMEs potentially encourages scholars to endeavor further geographic expansion of research on the much discussed brand of skill formation that is the collective type, thereby leaving behind the limitations of Hall and Soskice's CME-LME-dichotomy.

Secondly, by drawing attention to the importance of both, economic and political coordination the study underlines that monocausal argumentation is not viable as regards research on VET and especially the explanation of differences between training systems. Vossiek's book strengthens the argument put forward by previous authors about the co-evolution of institutions such as those of VET and industrial relations. It also falls in line with existing institutional political economist research by making a strong case against the state' as neutral broker between stakeholders in the political arena of VET (and elsewhere), instead the study sheds light on the importance of state structures and partisan politics in determining the nature of the relationship and power distribution between key political actors.

Thirdly, Vossiek underlines once again, that VET regimes are not static but rather the products of recurring contestation of their constituent institutions by political actors. Apart from these achievements, two issues should be addressed. The first regards the preferences of political actors. Vossiek's analysis builds on a central tenet of the historical institutionalist political economy of VET: that cross-class relations and whether and how they are mediated by the state (for instance in the form of industrial relations or corporatism) are a central explanatory variable for differences between VET systems.

The reader is provided with insights into how stakeholder collaboration was sanctioned or dismantled by successive governments in the three LMEs and it is illustrated how governmental programs with a view to VET have evolved over time. However, this scrutiny is lacking concerning organized capital and labor. The analysis does not delve deeper into organized capital and labor's preferences and strategies regarding VET, neither in the country-chapters nor in cross-national comparison. What (if anything) did organized capital and labor exactly have to say about VET at different moments in the history of skill formation in the three cases? (How) Did this impact on why preferences were or weren't considered in the political arena of VET?

How has the nature of skill formation institutions and how have reforms impacted on preferences and strategies? While one learns whether capital or labor's preferences changed over time, it is not clear what precisely was subject to change and which legacies weighed too heavy to be done away with.

It is argued here that a closer look at organized capital and labor's preferences and strategies would have provided additional substance for explaining processes of institutional change (or the absence thereof). It would have also contributed to a deeper understanding of cross-class relations and the distribution of power between the state, capital and labor concerning skill formation.

The second issue concerns the relevance of assumptions or expectations about partisan politics i.e. the preferences of political parties regarding certain policy areas and their ties with or distance to specific political actors and organized interests. This is not to deny that partisan politics matter, rather future research needs to ask whether one can still build on what is attributed to different partisan camps in the face of ongoing and more recent political trends that seem to blur the lines between right and left, conservative and progressive and so forth. Moreover close attention needs to be paid to what these labels actually mean in a given national context.

Vossiek's book might come in handy for practitioners and policy makers engaged in reforming education and training systems; it is certainly of interest for all those committed to understanding and explaining historical trajectories of, as well as variations between VET systems.

Biographical Note

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