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Title   Design-based research in the context of transitioning to VET: Developing interventions through research-practice collaboration

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Abstract   The transition from school to vocational education and training (VET) is becoming more difficult for an increasing number of adolescents. Despite the growing significance of this phase, there is hardly any research regarding interventions targeting students' resilience, especially with regard to their capacity to join the labour market. This paper aims at describing the research process of developing three different interventions in cooperation with a number of practitioners who teach in so-called interim solutions. The goal of the paper is, thus, to illustrate how design-based research (DBR) can be conducted in the context of vocational education. The comprehensive three-cycle development of three interventions with the aim of fostering students' conflict management competence, attribution and self-efficacy will be used as a single case study to illustrate a complex DBR project. Each step in the design-research process will be reflected, resulting in a discussion of the possibilities and obstacles of combining formative and summative evaluation in the DBR process.

Design-based research in the context of transitioning to VET – Developing interventions through research-practice collaboration

Taiga Brahm

1.0   Introduction

Although educational systems nowadays provide many opportunities, a number of adolescents are not able to make the (immediate) transition from obligatory schooling to working life (Billett et al., 2010; Lang, 2010). In the past, the pathways of adolescents from school to adult life have regularly been studied (e. g. Athanasou, 2001; Merino, 2007; Vlaardingerbroek & Hachem El-Masri, 2008). It seems that the pathways are becoming increasingly complex, i.e. students have more vocations to choose from and also different options what to do after school, e.g. further schooling or apprenticeship (Brynner at al., 1997; Taylor, 2006). This can also be stated for the transition of Swiss adolescents from obligatory schooling to VET (Masdonati et al., 2010). At the same time, there is quite some debate going on regarding how to effectively design learning environments for this particular context and also for vocational education and training (VET) in general where design problems have been identified and researched albeit to a very small extent (e.g. Aprea, 2014; Zitter et al., 2016; Zoyke, 2013; Burda-Zoyke, 2017). For instance, Zitter et al. (2016) recently proposed a hybrid VET curriculum across the school-work boundary which was developed in an extensive design-based research. Design-based research has been identified as a research methodology which simultaneously allows to design solutions for current and practically relevant problems, while at the same time contributing to theory development in a certain field (Brown, 1992; Euler, 2014a; Schwartz, Chang & Martin, 2005). While there is some research in the context of VET using DBR or related approaches (for a review see Burda-Zoyke, 2017), research regarding the actual design of learning environments in VET is scarce.

Thus, this article aims at reviewing an extensive design-based research project which was conducted in the context of students' transition from school to VET. In particular, the project's goal was to foster the resilience of students participating in so-called Swiss 'bridging solutions' (Brahm et al., 2014; Sacchi & Meyer, 2016). Gordon and Coscarelli (1996, p. 15) define resilience as „the capacity to thrive, mature, and increase competence in the face of adverse circumstances". As students in 'bridging solutions' usually did not manage to immediately continue their education, it can be assumed that there is the need to foster their resilience in order to support the adolescents on their transition into work. The 'bridging solution' is usually a one-year course with the goal to find a suitable apprenticeship or other job after further schooling.

In consequence, the goal of this paper is twofold: First, based on the research project, it aims at describing the whole research process in order to illustrate how design-based research can be conducted in the context of vocational education. Second, it aims to discuss how formative and summative evaluation can help to reach the dual goal of DBR, i.e. problem solution and research contribution. The following research question will guide this paper: How can a design-based research process be conducted?

2.0 Design-based research – a short introduction in the context of VET

The presented research is rooted in the design-based research methodology (Euler, 2014a; McKenney & Reeves, 2012; Plomp, 2007). As stated above, DBR is characterized by the development of innovative solutions for practical educational problems which should be accompanied by the acquisition of scientific knowledge (e.g. Gravemeijer & Cobb, 2006). „The challenge for design-based research is in flexibly developing research trajectories that meet our dual goals of refining locally valuable innovations and developing more globally usable knowledge for the field" (Design-Based Research Collective, 2003, p. 7).

As a recent review by Burda-Zoyke (2017) identifies, in the German-speaking VET research DBR has recently been taken up as an approach to support the "[…] the systematic study of designing, developing and evaluating educational interventions (…) as solutions for complex problems in educational practice, which also aims at advancing our knowledge about the characteristics of these interventions and the processes of designing and developing them." (Plomp, 2007, p. 13). Thus, not only the effectiveness and viability of the intervention are investigated, also the design processes become a focal point of interest to the researcher.

In this context, it is worthwhile to note that research in VET has already had a strong tradition that focused on designing so-called "model trials" (German: Modellversuche) (e.g. Sloane, 1992, 2005), the communication between researchers and practitioners (Euler, 1994, 2014), curriculum research (Tramm, 1994) as well as the "research on innovation arenas" (Kremer, 2014; Kremer & Zoyke, 2013) (for an overview see Burda-Zoyke, 2017). These papers emphasize that there has been some tradition regarding design-oriented research in the VET community; however, according to our knowledge, exemplary approaches how to implement DBR in the VET context are rare (for an exception see Aprea, 2007; Slopinski, 2015; related approaches include Gerholz, 2014 and Raatz, 2015).

What DBR adds to the more traditional approaches from the VET tradition (see above), is the particular iterative process which aims at resulting in a practically viable solution (Edelson, 2002). Different models of how DBR can be conducted can be found in the literature (for exemplary models see Euler, 2014a; McKenney, 2001; Reeves, 2006). For this paper, the following DBR process according to Euler (2014a, p. 20) will be used:
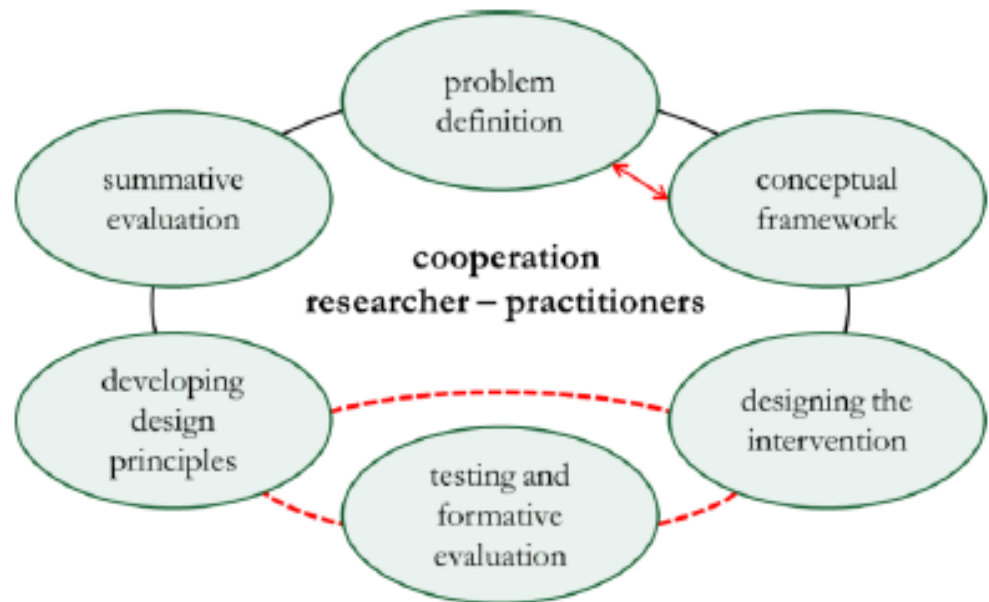
Figure 1: Design-based research process (according to Euler, 2014a, p. 20)

Furthermore, DBR is often characterized by a plurality of research methods: the complex aims of DBR can often only be reached by combining qualitative and quantitative methods (Brahm, 2015). „Design research is not defined by methodology. All sorts of methods may be employed. What defines design research is its purpose: sustained innovative development" (Bereiter, 2002, p. 325).

3.0 Case Study: Reviewing the design-based research project

The case study is based on a three year DBR project which aimed at designing, implementing, re-fining and evaluating three interventions to foster adolescence' resilience. The case study is grounded in an intensive reflection process which is based on various documents (e.g. the interventions, meeting protocols), student evaluation of the designed interventions, classroom observations, interviews with teachers and principals of the schools involved in the process. The documents were analysed by the author using inductive content analysis in order to review the most important steps and to identify critical moments in the DBR process. The methods for the formative and summative evaluation of the interventions will be described in more detail in the chapters below.

In the following, our case will be described along the steps of the DBR cycle according to Euler (2014a, p. 20).

3.1 Specify problem

In the first step, the challenge of adolescents' transition from school to VET or work was explored both from a theoretical and a practical perspective. In a pre-study, the practical relevance

of the identified problem was assessed (Brahm et al., 2014). Literature showed that about 20% of the school graduates in Switzerland do not find adequate educational opportunities on the upper secondary level (e.g. in the form of VET) and in consequence, they end up in so-called ‚bridging solutions' (Egger et al., 2007; SKBF – Schweizerische Koordinationsstelle für Bildungsforschung, 2010, p. 116ff.). In addition to this quantitative dimension of the ‚transition problem', expert interviews showed that the social and cognitive prerequisites of the youth in bridging solutions can be described as highly heterogeneous (AUTHORS, 2014). The spectrum of risks that endanger an immediate transition from school to working life ranges from learning weaknesses or insufficient school grades in basic skills such as literacy and numeracy to psycho-social burdens and lack of motivation due to difficult educational development or family background (ibid.). Additionally, there are adolescents in interim solutions who are competent and willing to take up a vocational training, however, some of them do not find an apprenticeship because of the current situation on the labor market. The question of how to design the 'bridging solutions' in order to contribute to students' development and to their finding a suitable job or VET placement after the bridging solution was of particular relevance to the experts interviewed (ibid.). To sum this up, the DBR project addressed this practically and theoretically relevant problem.

3.2 Evaluating literature and experience

As mentioned above, the overarching theoretical background of this study relies upon the concept of resilience (e.g. Gordon & Coscarelli, 1996). Participants in bridge courses have usually failed to find a suitable job or apprenticeship directly after their obligatory school time. Thus, they can be seen as facing 'adverse circumstances'. Furthermore, resilience is also described as the human capacity to cope with (life) crises by relying on either personal or socially mediated resources (Welter-Enderlin, 2006). From a pedagogical point of view, i.e. with regard to designing a learning environment, it is important to note that resilience can be fostered throughout one's lifespan (Gillespie et al., 2007). Instead of focusing on the adolescents' deficiencies, resilience emphasizes that every person has a certain potential (Atkinson et al., 2009). These psycho-social resources are called protective factors. However, it is assumed that protective factors are only in effect in connection with so-called risk-factors (Fingerle, 2011). Research has shown a number protective factors that can be assumed to foster resilience by either hindering the occurrence of a mental disorder or by increasing the chance for a positive development (Wustmann, 2009). Protective factors are usually distinguished into internal personal resources and social protective factors (Werner, 1990). Personal factors to deal with adverse circumstances include, for instance, problem-solving and communication skills, a positive self-concept, positive self-efficacy, empathy and cooperativeness. Social factors are found in the family or in social circumstances, i.e. in the educational in-

stitutions. Examples include transparent rules for adolescents, positive relationships to peers or teachers. Some protective factors can also be risk factors. For instance, high self-esteem is usually regarded as a protective factor; nevertheless, this can also lead to behavioural disorder (Fingerle, 2011). In conclusion, resilience can be fostered, however, is bound to specific types of situations and is difficult to transfer to other situational contexts (Häfeli & Schellenberg, 2009).

Resilience theory was empirically investigated in various contexts, in particular, in childhood and early adolescence (for an overview see Werner & Smith, 2001). Yet, for the specific and highly difficult context of youth at the transition from school to vocational education, hardly any studies can be found. Particularly, the question of whether resilience factors are addressed in interim solutions has rarely been addressed up to now (for an exception with regard to the development of adolescents' self-concept see Bonica & Sappa, 2010). In the field of bridge courses in Switzerland, only few empirical studies were conducted at all. These include the evaluation of the program Supra-f and of the program VIVA (Hüsler, 2008). Additionally, some intervention studies were conducted by Oser and Düggeli (2008) and Oser et al. (2004). The theoretical and practical impact of the available empirical studies seems rather limited since they were each conducted with a rather small number of participants. Accordingly, the effects of the intervention are also limited.

Starting from this theoretical and empirical basis, it was deemed necessary in the DBR project to analyse which resilience factors should be addressed by evaluating teachers' practical experiences in bridging solutions. The project was conducted in cooperation with teachers from four different schools in Switzerland. The schools' principals formed a so-called steering committee where major decisions regarding the project were taken. Based on five classroom observations and interviews with four school teachers and one headmaster during the fall of 2011 (by the author), the steering committee collaboratively agreed on three target competences to be developed to reach the overarching goal of fostering adolescents' resilience: these target competences are self-efficacy (e.g. Bandura, 1997), attribution style (Gurney, 1981; Masui & De Corte, 2005) and conflict management competence (CMC) (Keller, 2008; Stevahn et al., 2002). In the following, it will be shown how the interventions were designed and iteratively refined.

3.3 Develop and refine design

The design of the interventions followed the usual steps of defining the learning goals, the content and methods, developing the material. As it is often the case with pedagogical designs, this process was rather reciprocal than linear.

As the design of interventions is a complex endeavour, it was decided to split the task among a team of four researchers. Three researchers took over the main responsibility for one intervention each while the fourth researcher formed the 'linking pin'

between the interventions. The group of researchers met regularly to discuss the progress and also the interaction with practitioners. It is important to note that throughout the whole process, the researchers met with a team of three to five teachers at least twice per semester. In the beginning, the focus of these meetings was rather on discussing first ideas, exchanging viewpoints regarding the targeted and possible 'aspiration level' of the interventions. It was also important to generate a common understanding regarding the target dimensions by refining and detailing the learning goals for the interventions. For instance, this process led to the following over-arching aim for the intervention on CMC (in the following, the case description will use the intervention on CMC as example):

> The learners are able to conduct a (cooperative) conversation in order to deal with interpersonal and task conflicts. These conflicts are located at lower escalation levels in the professional and school context, for instance between superiors (teachers) and the learners as conflict parties.

This complex aim reveals the difficult negotiations between the teachers and the researchers in order to define the overall goal of the conflict management intervention. In multiple meetings with the teachers, we first negotiated the kind of conflicts that should be addressed in the interventions. Are interpersonal conflicts too private to be included? In order to reach the necessary personal relevance for the learners to stay motivated, it was decided to include both task and interpersonal conflicts. The next question addressed whether the adolescents should also learn how to mediate others' conflicts. However, it was decided that conducting a conflict conversation is difficult enough for the time available for the intervention. In the next step, this overarching aim was broken down into several learning goals:

The learners should …

- understand the 7-phase model of a cooperative conflict conversation and apply it adequately;

- understand and apply the relevant theoretical foundations and concepts for dealing with conflicts,

- purposefully prepare and follow up the cooperative conflict conversation,

- adequately structure the cooperative conflict conversation and execute the different phases purposefully;

- bear phases of missing solutions, generate and assess different approaches to solving the conflict;

- show a cooperative attitude and style.

These learning goals are further detailed for the development of the different parts of the interventions.

Based on the learning goals, the next step was to decide upon the content and methods in order to reach the learning goals. For the intervention on CMC, the overarching model of a cooperative conflict conversation by Keller (2011) was chosen. This

model includes seven phases which could also be used to subdivide the intervention (ibid.). The overall intervention followed the model of a 'spiral curriculum' (Harden & Stamper, 1999), i.e. after introducing the cooperative conflict conversation model at the beginning of the school year, the model will be practiced repeatedly using six different cases. The following figure shows the intervention as an overview:
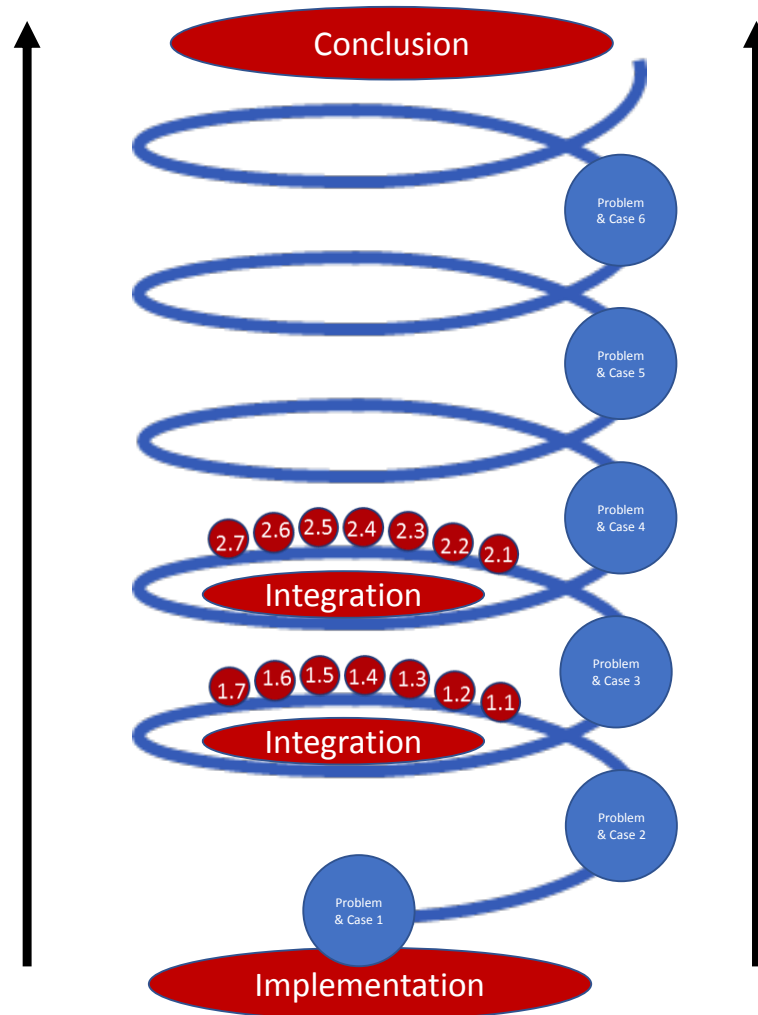

Figure 2: Overview on the conflict management competence intervention (source: University of St. Gallen) (The numbers refer to the different elements of the intervention).

For the first intervention, not only the overall layout of the intervention was intensively discussed with the teachers, also the overarching design principles underlying the intervention had to be negotiated. For the first round, the following principles could be agreed on:

• The intervention should be designed problem-oriented and case-based.

• The classes are conducted close to the learners, thus, leaving students concerned.

• The classes vary regarding methods and media.

• At the beginning, conflicts from different areas of life (family, friends) can be dealt with, later increasingly professional conflicts should be dealt with.

- At the beginning, the learners are guided rather intensively by the teacher (teacher-centered class); later, the students become increasingly active (student-centered class).

- Phases of action and reflection interchange, the reflection part increases from cycle to cycle.

- The aspiration level also increases step-wise.

The material included lesson plans, working sheets and solutions. All material underwent a feedback process with the teachers involved in the project. Before a meeting with teachers was scheduled, the researchers sent the newly-developed material to the teachers so that the teachers could have a thorough look at the material before the meeting. In a conversation between the teachers, the researcher(s) and often also the school principal, the material was discussed with regard to its suitability for the particular school context of 'bridging solutions'. A recurring topic was the aspiration level of the material which – from the teachers' point of view – was too high and too academic for the highly heterogeneous student group that was targeted with the interventions. In consequence, the material was often revised with the goal to reach the appropriate aspiration level for the students. In some cases, it was necessary to discard some of the material, for instance, some examples were not deemed appropriate for the target group as they included models, for instance, politicians that the adolescents were not familiar with.

In the first version, the intervention lasted 19 weeks and consisted of six cycles / case studies, eight work sheets, seven overhead slides presenting knowledge structures, and other material.

3.4 Test design and evaluate formatively

The interventions were tested in three different DBR-cycles. In the first DBR cycle, intervention V1 was tested only in the classes of those teachers who had supported the development of the interventions. The following table shows how many students and teachers were involved in the first testing cycle.

Intervention	School(s)	Number of students	Number of teachers
Causal attribution	BSB	46	3
Conflict management competence	GBS	41	4
Self-efficacy	R&L	49	4

Table 1: Overview of the first testing cycle

During the testing process, the schools were accompanied by the researchers who met at least four times with the teachers during the implementation. During the testing, data on the feasibility of the intervention was collected from teachers and stu-

dents. The teachers filled in work sheets after each lesson. In the worksheet, they noted how many students participated in the lesson. In addition, they replied to the following open questions:

- Were there diversions from the planned lectures (e.g. regarding your activity as a teacher, the time needed, the material used)? Please describe and explain briefly why?

- What did work well during the lesson? Why?

- What did not work so well during the lesson? Why?

- How would you assess the quality of the lesson?

- What suggestions do you have for improving the lessons (e.g. regarding the aspiration level, completion, comprehensibility, timing, learning goals...)?

In addition to these work sheets collecting qualitative data on the feasibility of the intervention, we also used surveys of the students in order to assess the effectivity of the intervention. In the first DBR cycles, these surveys were tested as they were part of the summative evaluation strategy which will be described further below. Furthermore, the researchers also participated in some of the lessons to obtain classroom observations of the interventions, using a standardized observation sheet. Unfortunately, it was not possible to video record the lessons. Instead, we also collected some copies of the worksheets that students had filled in.

The formative evaluation aimed at determining the feasibility of the intervention and to receive some initial feedback on its effectivity. All data was analyzed by summarizing the main points and comparing the different impressions from the various sources (feedback conversations, teachers' worksheets, classroom observations, students' worksheets).

The feedback on the three interventions was different in nuances. Overall, – to be honest – it has to be stated the team of researchers was quite concerned about the initial feedback. The teachers confirmed the relevance of the interventions in their feedback. For instance, one teacher stated "The students were rather irritated that there are conflicts which can be solved verbally. [...] It is very necessary to sensitize the students for the possibility of cooperative conflict resolution" (teacher, intervention on CMC after his/her first lesson; translated by authors). However, in particular for the intervention on CMC, the teachers who had all been involved in the design of the interventions also reported that the intervention "did not work" (teacher 1, first meeting after the testing had started). Another teacher said that the intervention was "too abstract" while at the same time "it bores the students". In close collaboration with the teachers, the researchers immediately took action concerning the CMC intervention. The main points addressed were the aspiration level and the repetitiveness of the spiral curriculum where students had to go through the same conversation steps again and again. Furthermore, in all interventions, students had difficulty to manage the change between action and reflection (which was one of the initial design principles). The teachers reported that the

students particularly liked the more active parts of the lessons, however, once they had to think about what a certain exercise means to them personally, most learners either refused to do the exercise or they only filled in the worksheets superficially. Teachers also reported that students found these exercises laughable and thus, did not take them seriously.

In the second and third DBR cycles, the interventions V2 and V3 were tested both in the school that had tested the intervention V1 before and in one or two other schools in order to make sure that the intervention would also be usable if teachers had not been involved in the design process. Thus, all three interventions were tested in at least two schools each. The following table provides an overview of the second and third testing cycles:

	Intervention 1 (conflict management)	Intervention 2 (self-efficacy)	Intervention 3 (causal attribution)
School 1	263 / X	263 / 252	X / 252
School 2	X / 84	118 / X	118 / 84
School 3	93 / X	X / 80	93 / 80
School 4	62 / X	X / 41	62 / 41
Sum	418 / 84	381 / 373	273 / 457

Table 2: Overview of participating students in the different interventions in the second and third testing cycles (X indicating that in this cycle the school did not participate in the invention, thus, no students participated).

The second and third DBR cycles yielded much more promising results of the testing. The largest refinements in the interventions were necessary within the first cycle (see above) and from the first to the second cycle. From the second to the third cycles, smaller changes could still be implemented, for instance, regarding the handling of the intervention material and also including material which – in the meantime – had been developed by the teachers involved.

3.5   Generate design principles

In accordance with the design refinement, the initial design principles (see above) were also enriched over the course of the DBR process. Instead of discussing the different versions of the design principles, in the following the latest version of the principles for the CMC intervention and a short reasoning for the more concrete principle (in comparison to the first principles above) will be presented:

Principle	Reasoning for the principle
The conflict management model (consisting of 7 phases) needs to be simplified.	Prerequisites of the students Feedback of the practitioners that the students are overwhelmed by the whole model.
The model needs to be introduced stepwise.	Again: students were overwhelmed by the whole model. At the same time, they were bored to repeat the model every week after it was introduced as a whole in the beginning.
In addition to conflict management skills, communication skills need to be fostered in the exercises.	Missing communication skills of the students in order to manage a conflict productively. Exercises help students focus in class. Communication skills can be seen as a prerequisite of conflict competence.
By using student adequate cases, the relevance of the topic for students should be emphasized.	The selected cases seem to be the didactical element to keep the students focused. The cases need to address female and male learners. The cases need to be realistic problems from the students' point of view.
Students should conduct role play.	Role play shows students whether they already developed the conflict management skills necessary for cooperative conflict management. Role play in an activating method which helps keep students focused and attentive. Role play usually concerns all students.

Table 3: Design principles for the intervention regarding conflict management.

3.6 Evaluate the intervention summatively

Design-based research is often criticised for reporting the results only in qualitative manner (Tolboom & Kuiper, 2014). To overcome this criticism, the formative evaluation of the designed intervention was complemented by a quantitative evaluation.

While the interventions were developed using design-based research, the research questions presented in this proposal were tackled using a pre-post-transfer-measurement with experimental and control groups. In detail, the intervention and data collection procedure went as follows:

In order to have enough students for both intervention and control groups, one intervention was implemented in each school. For instance, in school A the intervention on self-efficacy, in school B, the intervention on conflict competence was implemented and so on. Thus, students of school A were in the experimental group of the intervention on self-efficacy, at the same time, they were used as control group for the other two interventions. The students were asked to fill in questionnaires about their self-efficacy, their conflict competence and their attribution style before the implementation of the intervention and after the intervention. In addition, we also asked the teachers invol-

ved in the project to report their insights on the interventions in observations sheets. For the questionnaire, mostly existing instruments were used (Schwarzer & Jerusalem, 1999; Jerusalem & Satow, 1999; Krampen, 1991; Oser & Düggeli, 2008). The reliability of the instruments proved to be acceptable (Cronbach's Alpha between .587 and .765). Data analyses were conducted using SPSS and MPlus Version 7.2 based on 302 questionnaires where data had been collected for all three time points. For conflict management skills, results show that students developed their competences in only one dimension of the conflict management competence, i.e. regarding dealing with missing solutions. There, the self-reported data showed an increase of 0.169 (p < .05). For the competence dimension "structuring conversations", the students showed a small increase of 0.140 (p < .05) from the first to the second measurement which then decreased from the second to the transfer measurement again. A similar pattern could be identified for school-related self-efficacy. For job-related self-efficacy, the students showed the strongest development with an overall increase of 0.376 (p < 0.001). Overall, we found mixed results in the summative evaluation of the interventions. However, as some of the dimensions as shown above indicated small but significant competence developments, this at least suggests that the targeted interventions were somewhat useful for the adolescents. In the following, the limitations of our research will be discusses in more detail.

4.0 Discussion, conclusion and outlook

The paper reflected on a comprehensive design-based research project aiming at developing viable interventions to foster students' conflict management competence, self-efficacy and effective causal attribution. The problem statement was generated by discussions between teachers in interim solutions and researchers (Brahm et al., 2014). At the same time, a research gap was identified since existing evaluation studies of interim solutions do not go beyond quantitative recordings of the transition quota (e.g. Gertsch et al., 2011) and hardly address the designing of interventions for the target group of adolescents (for an exception, Oser & Düggeli, 2008). The research-practitioner teams went through the DBR cycle three times. In each cycle, design improvements were implemented and tracked.

Both qualitative and quantitative research methods were employed in order to support the fine-tuning of the interventions. While the formative evaluation mainly included qualitative methods such as document analysis, focus groups and classroom observations, the summative evaluation consisted of a quantitative survey of all students participating in the intervention. The formative evaluation provided rich data regarding the feasibility of the interventions and possible improvements. Although there were some aspects like the aspiration level and the general outline of the intervention that needed to be tackled during the re-designing process, overall, there was anecdotic evidence that the students further developed their competences and that they overall benefitted from the interventions. The results

of the summative evaluation, however, are tentative regarding the students' competence development, i.e. they developed in some dimensions while there was no significant difference between measurement points and/or groups in other dimensions. One reason for this might be a reflection effect such that during the interventions, the adolescents became more aware of the competences addressed in the interventions and in consequence might have discovered that they are not as capable as they thought at the first measurement point. Another reason might have been that for the summative evaluations, a "real" control group was missing as all schools in the district wanted to participate in the project. In consequence, all groups underwent one of the interventions. All in all, the project does not only close with these mixed results. Based on the formative evaluation and the step-wise fine-tuning process in close cooperation with the teachers, three interventions are now implemented in all bridge courses in one district of Switzerland. As shown the researcher team intended to actively connect formative and summative evaluation elements. However, the interplay could have been more pronounced. The summative evaluation was always planned and well-prepared, nevertheless, the concrete changes in the intervention were put forward through aspects of the formative evaluation, above all the observations in the classroom and the conservations with the practitioners. For future DBR projects, it would be worthwhile to plan the interplay between formative and summative aspects even more thoroughly and to have concrete strategies on how to use the results of (quantitative) competence measurements for the further development of the interventions (see also Brahm, 2015).

In the course of developing and fine-tuning the intervention, the concept of resilience often provided an adequate and well-founded theoretical framing for the DBR project. However, it was only used as an overarching framework. During the interaction with the practitioners, the three more concrete targets of the intervention, i.e. conflict management, self-efficacy and causal attribution, were discussed much more intensely than the original theoretical lens of the project. This was also due to the fact that resilience can be interpreted as a rather abstract concept. Our DBR process showed that the practitioners were more motivated to discuss the concrete intervention topics from a rather practical point of view.

In this regard, design-based research certainly provides the advantage of opening up the cooperation between researchers and practitioners and of actively using the practitioners' insights into the educational processes. It helps to see and notice different things (Mercieca & Mercieca, 2013). While the relevance of practice is certainly an important criterion for educational research, we nevertheless agree with Gutierrez and Pernuel (2014) that "Interventions themselves are contested spaces, filled with tensions and resistance from a range of stakeholders." (p 20). In line with this, another limitation of our DBR project shines through. Although the project was well supported by the schools' administration, it nevertheless depended a lot on the cooperation and openness of the teachers involved. For instance, in the

first round of testing, the teachers did not only choose voluntarily to participate in the pilot project. In consequence, the intervention was – in the beginning – mainly developed by the researchers. In the first design phase, the teachers intensively gave feedback on the goals, the lesson plans and the material. Only during the implementation, some of the teachers contributed their own material or developed their own worksheets.

After rolling out the pilot to more students, the competences and motivations of the teachers became even more diverse. It has also to be noted that other subject matter material was taken out of the curriculum in order to make room for the intervention; thus subject-oriented teachers (for Math and Languages) tended to be less in favor of the intervention. Unfortunately, there was no possibility to control for teacher motivation in our quantitative results, even though it became obvious in the interviews with the practitioners that their support of the project varied which most likely influenced the quality of the interventions.

While we indeed need new approaches to developing and implementing interventions in a cooperative effort between researchers and practitioners, the interplay between the summative and the formative evaluation of the interventions needs more attention in order to have innovative and feasible solutions to relevant problems and at the same time robust and viable research insights.

The insights of this paper are relevant for both educational researchers and practitioners. For researchers, the paper shows a possible implementation process of a rather complex DBR project. For the first time to our knowledge, the concept of resilience has been put into practice within a DBR approach. This research, therefore, broadens the scope of the transition to VET literature towards socio-psychological discourses. At the same time, the results of our DBR project are useful for teachers in VET. The three interventions that were developed as part of this research are available and can be used not only in interim solutions but in general in courses targeting students' readiness for apprenticeships and the job market.

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