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Competence Profiles of Vocational Teachers in Sweden

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Abstract

Purpose: Vocational teachers' professional work builds on both vocational and teaching competence, requiring vocational teachers to balance multiple identities in their professional practice. As a professional group coming to education from different vocational disciplines, vocational teachers also have various educational backgrounds, teaching experience, or competence profiles. Nevertheless, teacher training programmes treat them as a homogeneous group. This study aims to identify competence profiles among vocational teachers in Sweden and analyse background factors associated with these competence profiles.

Methods: Data was collected via an online survey, asking vocational teachers to respond to questions on how important they considered different competences to be for vocational teaching and rate to what extent they had achieved different competences. The sample included 280 vocational teachers from various disciplines. The survey data was analysed using k-means clustering.

Results: Two main competence profiles emerged in the analyses. Profile 1 had mainly male vocational teachers with extended occupational experience and limited teaching experience. These teachers reported lower achieved competence in all areas compared to teachers in Profile 2. Profile 2 included mostly female vocational teachers with longer teaching

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experience and more limited occupational experience. A higher percentage of these teachers had teacher training, and they reported higher achieved competence in all areas. Several background factors were associated with these two competence profiles, but no relations of cause and effect were proved.

Conclusion: The competence profiles rather highlight the differences and different learning needs among groups of vocational teachers, leading to the conclusion that vocational teachers in Profile 1 might need further or a different type of support in their professional development.

Keywords: Vocational Educational and Training, VET, Vocational Teachers, Competence Development, Competence Profiles, Cluster Analysis

1 Introduction

Discussions and research in Vocational Education and Training (VET) have increasingly been focused on recruitment, employability, and efficiency. Over the last couple of decades, policy reforms have resulted in a stronger focus on workplace learning, labour market needs, and ties between the vocation and the education programmes in upper secondary education. Since working life and education are characterised by different logics – that is, a school rationale and a production rationale (Jørgensen, 2004) – shifts in the organisation and curriculum of VET mean that vocational teachers need to be able to reprioritise among different kinds of competence and be able to navigate different competence regimes (Billett, 2011; Wenger, 1998).

Vocational teachers' professional practice requires broad competence, rooted in the vocation, and teaching competence, which can be developed in higher education settings, but also at work or other aspects of everyday life. It is highly important to have up-to-date connections with the industry and up-to-date knowledge in relation to a rapidly changing labour market with technological innovation and new ways of organising work (Andersson & Köpsén, 2019; Confederation of Swedish Enterprise [CSE], 2020; Mårtensson et al., 2019). Vocational teachers have to balance double identities in their professional practice, where they are oriented towards the logics and cultures of both their vocation and the teaching profession. From a societal perspective, Sweden is experiencing a shortage of vocational teachers in many fields (Statistics Sweden, 2024). This has led to less strict demands for formal credentials and certification for vocational teachers than for other teaching professionals in Sweden. Vocational teachers can thus be employed without formal teaching credentials. Still, in order to become a qualified vocational teacher, it is necessary to undergo vocational training and thereafter a professional teacher training programme at a higher education institution. Although vocational teachers are often treated as a homogeneous group from a training perspective, for

example, they are not homogeneous; besides the different vocational disciplines they represent, they are also individuals with various educational backgrounds, teaching experience, or competence profiles. In Sweden there is limited publicly available statistical information on this group and limited research when it comes to measurements of achieved competence in vocational teacher sub-groups, such as in different vocational programmes. The aim of the study is to identify competence profiles among vocational teachers in Sweden and analyse background factors associated with these competence profiles. More specifically, the research questions addressed are:

- What competence profiles can be identified among vocational teachers in Sweden?
- What background factors are associated with these competence profiles?

This article constitutes a continuation of previous work (for more details see Antera, 2023b; Antera & Teräs, 2024). Results from this previous work offer a detailed description of important and achieved competence for vocational teachers in Sweden, as well differences identified between teachers with and without teaching qualifications/training. The present analysis moves one step further and through clustering explores connections among perceiving competence areas as important. The sample of this study is not big enough for detailed breakdowns into background variables (and how they interact). Therefore, clustering is an appropriate method for generating a deeper understanding about differences within the group of vocational teachers and differing needs. By introducing background factors in this equation competence profiles contribute with outlining categories of vocational teachers and how they perceive their competence development. Competence profiles can assist with identifying teachers' need and with supporting them better during initial or in-service training.

2 Theoretical Framework

The following chapter describes the background and theoretical framework of the study.

2.1 VET in Sweden

The Swedish education system is characterised by a high degree of marketisation. VET and other education programmes are offered by public (municipal) schools and by independent/for-profit schools (Alexiadou & Lundahl, 2016), hereafter referred to as private schools. Regardless of school form, students do not pay tuition fees. Besides the presence of private schools, the financing and the legal responsibilities for education are state-oriented, while national and regional responsibilities vary with reference to VET related issues. Regional

regulations define upper secondary schools, while regions, municipalities, and the state hold the legal authority of upper secondary schools. The presence of both public and private education providers creates different conditions of employment for vocational and other teachers. According to statistics from the National Agency for Education (NAE), vocational teachers employed in privately owned schools are less likely to have formal qualifications, a degree from a higher education programme in teaching, and teacher certification (NAE, 2022a).

VET in Sweden is offered at upper secondary level (European Qualification Framework – EQF 4) for young students in high schools and for adult students in adult education. VET is also offered at tertiary level (EQF 5 and 6) by vocational colleges. VET at the upper secondary level, which is the main focus of this study, consists of 12 vocational programmes that are mainly school-based but can be offered as apprenticeships as well. Around one third of the students at the upper secondary level choose to pursue vocational studies (Skolverket, ReferNet Sweden, 2019).

The 12 vocational programmes are: Health and social care; building and construction; vehicle and transport; agriculture; children and recreation; business and administration; industrial technology; electricity and energy; restaurant management and food; handicraft; heating, ventilation, air conditioning (HVAC), and property maintenance; and hotel and tourism (Skolverket & ReferNet Sweden, 2019). The highest participation in the academic year 2021/22 was noted in the electricity and energy programme. This was followed by the building and construction programme and the vehicle and transport programme. Since mostly male students participate in these programmes, the share of men in Swedish VET is larger (with approximately 60% male and 40% female students; NAE, 2022b).

Work placement during vocational programmes (in Swedish: ArbetsPlatsLärande, APL) refers to the education of students in workplaces. Work placement is included in vocational programmes and lasts for a minimum of 15 weeks in school-based programmes and 50% of the time for apprenticeships. This part of the education is guided by the subject syllabi and the vocational teacher is responsible for its smooth realisation, while the education provider (the school) should ascertain the overall quality of the process. During work placement, vocational students are assigned a supervisor at the workplace in addition to the vocational teacher that oversees the process (NAE, 2024a).

2.2 VET Teachers and VET Teacher Training

As in many other countries, vocational education and training (VET) in Sweden faces the challenge of being perceived as having a lower status compared to academic subjects. Despite the formal possibility of progression to higher education, VET is often seen as having weaker links to higher education and reduced relevance in that context, due to its stronger connection to the labor market. Similarly, vocational teachers are often viewed as having lower status

compared to teachers of academic subjects. This perception may be influenced by the historical development of vocational teaching in Sweden, where specialised pedagogical training for vocational teachers was introduced relatively recently, in 2011. The 2011 reform established qualifications for kindergarten, primary, and vocational teachers (French et al., 2014), which had not been available previously.

Vocational teachers in Sweden are an ageing group, given the late start of their teaching career. In 2014, vocational teachers' average age was 49 (NAE, 2014). The requirement for vocational qualification and work experience in the occupation prior to starting a career as a vocational teacher contributes to the high average age. In turn, it also shortens the duration of the teaching career. The issue of the shortage of vocational teachers is intensified by the low number of students enrolled in VET teacher training programmes and the high demand for teachers that the labour market sets (CSE, 2020). The shortage is distributed unequally between different vocational programmes. For instance, electricity and energy and the industrial technology programme suffer from the biggest shortage (Asghari & Berglund, 2020; Berglund et al., 2017).

An additional characteristic of the vocational teacher profession is the percentage of not-formally qualified teachers[1]. Of the vocational teachers employed in upper secondary schools, 57.7% are qualified in teaching (NAE, 2022a). In adult education, this percentage reaches 63.9% (NAE, 2022a). Approximately 30% of vocational teachers are, hence, not qualified in teaching, creating a special condition for the Swedish VET. The unavailability of qualified vocational teachers has led to the employment of not-formally qualified teachers with the aim to cover the education needs.

Vocational teacher training is offered by universities as a 90 ECTS programme (60 ECTS in courses and 30 ECTS in work placement). The programme focuses on didactics and pedagogy. Vocational subject knowledge and qualifications are therefore requirements for the participation in the programme (Skolverket, ReferNet Sweden, 2019). The VET teacher training programme does not result in subject specialisation, but it is training tailored to vocational teaching (Antera, 2023b). Once you have obtained a formal teaching degree as a vocational teacher from a higher education institution, you can apply for teacher certification from the Swedish National Agency for Education in order to be formally qualified as a vocational teacher.

1 *Not-formally qualified* refers to teachers that have not completed teacher training.

2.3 Previous Research on Vocational Teachers' Competence Profiles and Background Factors

While research on vocational teachers within the Nordic countries provides some valuable perspectives, it remains limited. Research on vocational teachers is often highly context-bound, which is a result of the various VET systems and the multiple particularities within them that affect the work and the profile of vocational teachers as professionals. For this study, the previous research presented refers mostly to studies that have explored vocational teachers' competence and practice in relation to background factors such as age, gender, occupational experience and so on. The aim is to map previous research and inform the inquiries of the present study.

Antera (2023a) compared pedagogically qualified and not-formally qualified vocational teachers in Sweden, finding that those who lacked qualifications evaluated a series of items relating to the actual teaching process and more formal aspects of teaching as less important than their qualified colleagues did. This study raised a series of concerns about the confidence of not-formally qualified vocational teachers as well as the form of (professional) identity they promote through their teaching. Antera et al. (2022) also showed that the school environment might be a factor affecting vocational teachers. In their study, vocational teachers in adult education schools had higher self-reported rates of knowledge of different cultures and working experience with adults and migrants.

Furthermore, Pillen et al. (2013) explored tensions for beginning teachers concerning what they would like to do and what is possible for them to do in their practice. In general, background variables did not play a significant role for the degree to which respondents found themselves to be experiencing tensions. The only background factor of statistical significance was gender, with female teachers finding themselves facing more tensions. In addition, having the role of a peer rather than a teacher was associated with age in this study. Nevertheless, statistically significant differences were found only between younger (20–24 years old) and older teachers (30 years or older), and not between the other age categories.

According to Nylund and Gudmundsson (2017), vocational teachers in the building and construction programme develop the profile of a *teacher* or that of a *craftsman*, setting professional identity as the main factor affecting choices related to professional life and to students' learning. Both profiles place great importance on vocational knowledge and skills, but the 'craftsman' considers such knowledge more important than pedagogical issues. In contrast, the 'teacher' considers school culture, pedagogical issues, and vocational competence to be almost equally important and regards vocational culture as more closely associated with pedagogical issues and school culture.

The idea of vocational teachers in technical programmes prioritising the development of vocational rather than generic competencies for students has been further supported by research in the Finnish context (e.g., Löfgren et al., 2022). In the same line, a study from

Hungary showed vocational teachers identifying as both teachers and occupation professionals, with the identity type varying based on gender and length of occupational experience (Bükki & Fehérvári, 2024). When it comes to which specific competence areas the vocational teachers consider important, this study showed a dominance of vocational expertise, with subject matter knowledge seen as the most important competence. Significant differences in the ranking of competence were found with reference to gender, qualification (teaching and vocational), and previous occupational experience, while holding pedagogical qualifications seemed to make the biggest difference in the ranking of competence.

Exploring the competence profiles of clinical nurse educators and the background factors associated with them, Kaarlela et al. (2022) suggested a relationship between levels of self-assessed competence and background factors that merits further exploration. They identified two distinct competence profiles among the teachers. Profile 1 included participants with a higher mean age (48 years), longer occupational experience (10 years), and longer teaching experience within hospitals (seven years) compared to Profile 2 participants. Furthermore, the teachers in Profile 1 had a higher level of education and had also to a higher extent completed health science teacher education. In contrast, the Profile 2 respondents had mostly completed vocational teacher education (63%). Teachers in Profile 1 reported higher levels of self-assessed competence in mentoring students to develop their own competence, in evidence-based practice, in ensuring quality in clinical learning environments, in student-centred pedagogy, and in leadership and management. Profile 2 respondents reported higher levels of self-assessed competence in digital collaborative learning and lower levels in cultural and linguistic diversity competence. Finally, respondents in both profiles reported weak levels of subject and curriculum competence, which was lower for the Profile 2 respondents.

Focusing on vocational teachers' motivations for entering the teaching profession, Kristmansson and Fjellström (2022) reached the conclusion that a career shift to teaching is dependent on the working conditions of the former occupation. Furthermore, they clustered vocational programmes into high and low teacher certification, and also claimed a strong correlation between proportions of female teachers and teachers qualified in pedagogy. Relationships between gender and a high perceived value of continuous professional development of vocational teachers were also found in the work of Andersson et al. (2018). However, the authors discussed how this finding might be misleading, as some vocational areas, such as health care and child care, have a higher representation of women as well as teachers with higher levels of education (often university degrees).

Taking a starting point in previous research, this study considers the following background factors of interest to explore: Age, gender, working experience in the previous occupation, working experience in teaching, level of education, teacher qualification, and type of school where vocational teachers are employed. These background factors will be investigated with reference to achieved competence.

3 Methods

This study has a cross-sectional survey research design, and the empirical data was collected via a questionnaire administered online.

3.1 Sample

The study population consists of upper secondary vocational education teachers in Sweden, which includes teachers in upper secondary schools and adult education centres. The selection of schools to contact was based on the national register provided by the National Agency for Education (NAE, 2020). This selection included upper secondary schools with more than ten vocational students in 2019/20 and all adult education centres, since the register does not offer sufficient information to identify which ones offer VET courses. In total, 759 upper secondary schools and 390 adult education centres were contacted.

The sample consists of 280 vocational teachers. The proportion of not-formally qualified teachers in the sample was 31.4%. This is lower than the proportion of not-formally qualified teachers in the vocational teacher population as a whole ($\chi 2 = 6.37$; $df = 1$; $p < 0.01$). The sample is, however, representative regarding the teachers' distribution over different vocational programmes (no statistically significant difference from the population: $\chi 2 = 15.70$; $df = 11$; $p < 0.05$) (see Antera et al., 2022).

The vocational teachers in the sample had an average age of 49.8 years, compared to the national average of 49 years according to the official Swedish national statistics (NAE, 2014). Around 57.5% of the teachers in the sample had completed vocational teacher education and 55.9% of them had a vocational teacher certification. On average, the teachers in this study had 16.74 years of occupational experience and 10.26 years of teaching experience. Here it should be noted that some may work in their occupation at the same time as they teach. Regarding gender representation, 49.6% of the teachers in the sample identified as female and 50.4% as male. The vocational programmes' representation in the sample is presented in the Table 1.

Table 1: Representation of Vocational Programmes in the Sample and in the Population

Vocational training programme	*Percentage in sample*	*Percentage in population*
Children and recreation	10.7	9
Building and construction	11.8	11
Electricity and energy	6.4	11
Vehicle and transport	11.1	12
Business and administration	8.6	7

Handicraft	3.9	6
Hotel and tourism	1.8	2
Industrial technology	7.5	7
Agriculture	11.1	10
Restaurant management and food	5.4	7
HVAC* and property maintenance	2.1	3
Health and social care	19.6	15
Total	100	100

Note. *HVAC = Heating, ventilation, and air conditioning. *Source*: Adapted from Antera et al. (2022).

A little more than half of the respondents had a vocational higher education degree as their highest reported education, 17% had a bachelor's degree, 14% had a master's degree, and 19% had no degree in higher education.

Concerning working conditions, 92% of the vocational teachers had a fixed contract and 91% held a full-time position as vocational teachers. Around 8% of the sample was employed part time in their occupation, while working as teachers. Finally, 75% of the sample were employed in upper secondary schools, while 25% worked in adult education centres.

In upper secondary education in Sweden, 73% of the teachers work in municipal schools and 27% in privately owned publicly funded schools (NAE, 2024b). In the sample, the distribution between teachers working in municipal (27%) and privately owned publicly funded schools (73%) was not significantly different from the population ($\chi 2 = 0.047$; df = 1; $p < 0.001$). In the sample, 73% of the teachers work in municipal schools and 27% in privately owned publicly funded schools. Respondents working in municipal schools were significantly more likely to have certification in vocational and other subjects ($\chi 2 = 7.52$; df = 2; $p < 0.02$). Respondents working in privately owned schools (Mean Rank [MR] = 123.97) also considered teacher training to be significantly less important than those employed in municipal schools (MR = 146.55) (Mann-Whitney U = 6 447.5; n = 280; $p < 0.04$).

3.2 Instrument

The survey study is based on a highly structured questionnaire. Most of the questions in the survey had fixed response choices from which the respondents could select one answer. The questionnaire was administered in Swedish as a digital online survey. It addressed demographic questions and a series of questions about what competence respondents perceive as important for teachers to have, which competence they have achieved, and challenges in their work. With the focus on competence perceived as important and competence considered achieved (achieved competence), the participants rated 27 items on a Likert-type attitude scale, from 1 to 7, responding to the question of to what extent they consider them as important for their job. The same items were assessed as to what extent participants think they

have developed or achieved the competence. The full list of the items that answered these questions are presented in Table 2.

Moreover, participants evaluated 30 items of perceived challenges. The background variables measured as nominal and interval scale data were, among other things, on gender, age, previous work experience, and qualifications. The questionnaire also covered a ranking question in which participants were offered 5 competence areas and were asked to prioritise them, starting with the most important for their work as vocational teachers.

This instrument was inspired by studies with a similar focus (e.g., Manley & Zinser, 2012; Sartori et al., 2015). However, some items were reformulated to fit the needs of the Swedish context (inspired by CSE, 2020; NAE, 2014). Before the survey was sent out the questionnaire was piloted (Antera et al., 2022). Limitations of the instrument refer to self-reporting as well as to individual interpretations of the items, especially considering that the questionnaire was in Swedish[2].

3.3 Data Analysis

The empirical data was analysed using SPSS 29.0 Statistics. This exploratory study aimed to derive competence profiles from a questionnaire measuring perceived competence. A principal component analysis was conducted to reduce the number of variables and transform the questionnaire items, presented in Table 2, into a smaller set of uncorrelated variables. These variables represented different dimensions of competence while retaining as much variance as possible. The resulting compound competences, derived from the principal components, formed the basis for the competence profiles identified through a cluster analysis. The cluster analysis partitioned the data into clusters such that individuals within each cluster exhibited high similarity, while being distinctly different from those in other clusters. In this study, the clustering was based on perceived competence, allowing for the classification of teachers into two distinct relatively homogeneous competence profiles.

The focus of the analyses was on the 27 questions measuring the vocational teachers' self-perceived achieved competence included in the instrument, which covered different aspects identified in previous research. The structure of the measurement on achieved competence was explored using a principal component analysis with Kaiser–Meyer–Olkin (KMO) test (0.91), Bartlett's Test of Sphericity ($\chi 2 = 3897.02$; $df = 351$; $p < 0.001$), and Varimax rotation (Table 2). The eigen values were higher than 1 and their communality was lower than 0.4. The factor model consisted of six components that explained 64.36% of the variance in the data. The internal consistency of the instrument estimated by Cronbach's alpha ranges from 0.64 to 0.89.

2 The items in this article were translated keeping the wording as close as possible to the original text.

The three items in the component associated to the lower alpha level of 0.64 cover competence related to *working with diverse student groups* and are all statistically significantly correlated.

Knowledge about other cultures is relatively highly correlated to *experiences of working with migrants* ($r = 0.50$; $p < 0.001$), and the latter is correlated to *experience of working with adult students* ($r = 0.41$; $p < 0.001$). However, knowledge about other cultures is not as strongly correlated to experience of working with adults ($r = 0.195$; $p < 0.001$). The variables included in the other components are associated with teaching competence (7 variables; Cronbach's alpha = 0.89), formal competence (four variables; Cronbach's alpha = 0.78), vocational competence in teaching (three variables; Cronbach's alpha = 0.82), administrative competence related to school life and teachers' action within school life (but not directly connected to teaching) (three variables; Cronbach's alpha = 0.71), and collaborative competence (one variable). Compound variables were created from the variables associated with the different components presented in Table 2.

The compound variables based on the components in the principal component analysis were clustered into competence profiles, grouping datapoints by similarity, using K-means clustering. Grouping individuals based on competence can be used as a basis to, for example, support professional competence development. The differences between the identified cluster groups or competence profiles were analysed using t-tests for the interval scale variables, and the results are reported as means and standard deviations. For ordinal data, Mann–Whitney U-tests were calculated to compare perceived differences in achieved competence between the two clustered competence profiles. The results for ordinal data are presented as mean ranks and medians. For nominal scale data, the statistical significance of the differences in frequency distribution was measured using $\chi 2$-tests (Field, 2009). The alpha level was consistently set to 5% ($\alpha = 0.05$).

Table 2: Principal Component Analysis, Varimax With Kaiser Normalisation

Component	*1*	*2*	*3*	*4*	*5*	*6*
Is able to plan the teaching process	0.653					
Can create conditions for all students' learning and development	0.734					
Can assess students' knowledge, skills, and abilities	0.797					
Clarifies the evaluation and grading criteria for students	0.586					
Evaluates and develops their own teaching	0.672					
Has good communication with the students	0.694					
Actively works with discrimination and other abusive treatment	0.575					
Has theoretical-didactical knowledge on teaching		0.757				
Has previous teaching experience		0.569				

Has knowledge of the curriculum they teach		0.688				
Has teacher training		0.787				
Keeps vocational knowledge and skills updated			0.654			
Collaborates with working life			0.835			
Participates in finding placement positions of quality			0.808			
Is willing to become a mentor for new teachers				0.614		
Has administrative skills				0.774		
Can work with student recruitment and school marketing				0.762		
Has knowledge of different cultures					0.606	
Has experience of working with adults					0.567	
Has experience of working with migrants					0.821	
Can collaborate with colleagues						0.706
Total variance explained	37.61	7.71	6.07	5.14	4.01	3.82
Cumulative variance explained						64.36
Cronbach alpha coefficient	0.89	0.78	0.82	0.71	0.64	

Six components emerged. Under factor 1 there is teaching-related competence, under factor 2 there is formal competence, while factor 3 refers to vocational teaching competence. Factor 4 addresses administrative competence related to school life and teachers' action within school life (but not directly connected to teaching), factor 5 is competence related to diverse student populations, and factor 6 includes collaborative competence.

4 Results

The empirical data consists of responses to a questionnaire from 280 vocational teachers in Sweden. Overall, the vocational teachers perceive their achieved competence to be relatively high. All competence aspects were rated in the higher end of the scale, ranging from collaborative competence (Median [Mdn] = 7.00), which more than half of the teachers rated at the highest end of the scale, via teaching competence (Mdn = 6.29), vocational teaching competence (Mdn = 6.00), formal competence (Mdn = 5.50), and administrative competence (Mdn = 5.00) to managing heterogeneous classrooms (Mdn = 4.67), which was rated as the lowest of the different competence aspects.

When asked to rank their achieved competence, the vocational teachers considered occupational competence to be the most important, followed by teaching competence, interpersonal competence, professional development, collaboration with actors in the labour market, and administrative competence, in that order.

4.1 Background Factors

Women rated their teaching competence (Mdn_{women} = 6.36; Mdn_{men} = 6.14; U = 8 045.5; n = 278; $p < 0.02$) and their formal competence (Mdn_{women} = 5.75; Mdn_{men} = 4.75; U = 6 894.5; n = 278; $p < 0.001$) significantly higher than the men did. There were no statistically significant differences between women and men regarding how they rated their vocational teaching competence (U = 10 192.5; n = 278; $p > 0.05$), administrative competence (U = 8 671.0; n = 278; $p > 0.05$), their competence in managing heterogeneous classrooms (U = 9 482.0; n = 278; $p > 0.05$), or their collaborative competence (U = 9 943.5; n = 278; $p > 0.05$).

Teachers employed in municipal schools (Mdn = 5.5) rated their achieved formal competence significantly higher than teachers employed in private schools (Mdn = 5.25) (U = 6 447.5; n = 280; $p < 0.05$). There are no statistically significant differences between teachers in municipal and private schools regarding their self-reported teaching competence (U = 7 382.5; n = 280; $p > 0.05$), vocational teaching competence (U = 7 596.5; n = 280; $p > 0.05$), administrative competence (U = 7 429.0; n = 280; $p > 0.05$), their competence in managing heterogeneous classrooms (U = 6 758.0; n = 280; $p > 0.05$), or their collaborative competence (U = 7 015.5; n = 280; $p > 0.05$).

Teachers with certification ($Mdn_{certified}$ = 6.29) rated their achieved teaching competence significantly higher than teachers without certification ($Mdn_{non\text{-}certified}$ = 6.14) (U = 6 646.5; n = 279; $p < 0.001$), and the same goes for their formal competence ($Mdn_{certified}$ = 6.00; $Mdn_{non\text{-}certified}$ = 4.25; U = 3 384.0; n = 279; $p < 0.001$) and administrative competence ($Mdn_{certified}$ = 5.33; $Mdn_{non\text{-}certified}$ = 4.33;U = 7 128.5; n = 279; $p < 0.004$). There are no statistically significant differences regarding their self-reported vocational teaching competence (U = 8 179.5; n = 279; $p > 0.05$), their competence in managing heterogeneous classrooms (U = 8 365.0; n = 279; $p > 0.05$), or their collaborative competence (U = 8 912.0; n = 279; $p > 0.05$).

4.2 Competence Profiles of the Vocational Teachers

To analyse the structure of the variation in the perceptions of achieved competence among the vocational teachers, a cluster analysis was conducted. The cluster analysis generated two competence profiles. The first profile consisted of vocational teachers who considered themselves to have achieved a higher level of all competence aspects than those in the second profile. There were no statistically significant differences between the competence profiles regarding age or years of working experience in the institution employed during the data collection (Table 3).

Table 3: Competence Profiles Based on Vocational Teachers' Achieved Competence (Compound; n = 280)

Background factors and achieved competence	*Profile 1 (n = 133)*	*Profile 2 (n = 147)*		*Total*
		Gender		
Men				
Observed count (f_o)	78 (59%)	60 (41%)	$\chi2 = 8.98$; df = 1; $p < 0.005$	138 (50.4%)
Expected count (f_e)	65.5	72.5		
Women				
Observed count (f_o)	54 (41%)	86 (59%)		140 (49.6%)
Expected count (f_e)	66.5	73.5		
		Age		
Mean	48.99	50.56	t = −1.38; df = 278; $p > 0.05$	49.81
Standard deviation	9.17	9.72		9.48
		Years employed in current school		
Mean	7.41	7.79	t = −0.45; df = 277; $p > 0.05$	7.61
Standard deviation	7.13	7.18		7.14
		Years working as vocational teacher		
Mean	9.05	11.37	t = −2.38; df = 277; $p < 0.009$	10.26
Standard deviation	7.79	8.42		8.19
		Years working in previous vocation		
Mean	18.29	15.34	t = 2.78; df = 277; $p < 0.003$	16.74
Standard deviation	8.75	8.94		8.96
		Type of school of employment		
Upper secondary education				
Observed count (f_o)	109 (83%)	101 (69%)	$\chi2 = 6.73$; df = 1; $p < 0.009$	210 (76%)
Expected count (f_e)	99.7	110.3		
Adult education				
Observed count (f_o)	23 (17%)	45 (31%)		68 (24%)
Expected count (f_e)	32.3	35.7		
		School owner		
Municipal				
Observed count (f_o)	98 (74%)	107 (73%)	$\chi2 = 0.29$; df = 1; $p > 0.05$	205 (73%)
Expected count (f_e)	97.4	107.6		
Private				
Observed count (f_o)	35 (26%)	40 (27%)		75 (27%)
Expected count (f_e)	35.6	39.4		
		Certification		
Vocational subjects (f_o)	61 (46%)	95 (65%)		156 (55.9%)
Vocational subjects (f_e)	74.4	81.6		
Other subjects (f_o)	6 (4%)	16 (11%)		22 (7.9%)
Other subjects (f_e)	10.5	11.5		

No (f_o)	66 (50%)	35 (24%)		101 (36.2%)
No (f_e)	48.1	52.9		
Teacher training degree				
Vocational teaching degree (f_o)	64 (48%)	97 (66%)	$\chi 2 = 23.21$; df = 2; $p < 0.001$	161 (57.5%)
Vocational teaching degree (f_e)	76.5	84.5		
Other teaching degree (f_o)	9 (7%)	22 (15%)		31 (11.1%)
Other teaching degree (f_e)	14.7	16.3		
No (f_o)	60 (45%)	28 (19%)		88 (31.4%)
No (f_e)	41.8	46.2		
Teaching competence (factor 1)				
Mean rank	88.29	187.73	Mann-Whitney U = 16 719; n = 280; $p < 0.001$	
Median	5.71	6.57		6.29
Formal competence (factor 2)				
Mean rank	80.49	194.80	Mann-Whitney U = 17 757; n = 280; $p < 0.001$	
Median	4.00	6.25		5.50
Vocational teaching competence (factor 3)				
Mean rank	100.09	177.06	Mann-Whitney U = 15 150; n = 280; $p < 0.001$	
Median	5.33	6.33		6.00
Administrative competence (factor 4)				
Mean rank	87.47	188.48	Mann-Whitney U = 16 829; n = 280; $p < 0.001$	
Median	4.00	6.00		5.00
Competence in managing heterogeneous classrooms (factor 5)				
Mean rank	87.00	188.91	Mann-Whitney U = 16 891; n = 280; $p < 0.001$	
Median	4.00	5.67		4.67
Collaborative competence (factor 6)				
Mean rank	113.79	164.67	Mann-Whitney U = 13 328; n = 280; $p < 0.001$	
Median	6.00	7.00		7.00

Competence Profile 1 had a higher proportion of male vocational teachers. The teachers under this profile had worked longer in their vocation, but shorter as vocational teachers. Regarding vocational programmes, competence Profile 1 consisted of a higher proportion of teachers working in the building and construction programme and the agriculture programme (Table 4). Teachers in Profile 1 were to a significantly higher extent employed in upper secondary education and teachers in Profile 2 in adult education. Regarding employers, the teachers in the different profiles were as likely to work for a municipal as a privately owned school.

Table 4: Competence Profiles of the Vocational Teachers by the Educational Programmes They are Mainly Teaching in (n = 279)

Programmes		*Competence profiles*		
		1	*2*	*Total*
Children and recreation[a]	*Observed count (f_o)*	7 (5.3%)	23 (15.8%)	30 (10.8%)
	Expected count (f_e)	14.3	15.7	
Building and construction[a]	*Observed count (f_o)*	26 (19.5%)	7 (4.8%)	33 (11.8%)
	Expected count (f_e)	15.7	17.3	
Electricity and energy	*Observed count (f_o)*	6 (4.5%)	12 (8.2%)	18 (6.5%)
	Expected count (f_e)	8.6	9.4	
Vehicle and transport	*Observed count (f_o)*	15 (11.3%)	16 (11.0%)	31 (11.1%)
	Expected count (f_e)	14.8	16.2	
Business and administration*a*	*Observed count (f_o)*	6 (4.5%)	18 (12.3%)	24 (8.6%)
	Expected count (f_e)	11.4	12.6	
Handicraft	*Observed count (f_o)*	4 (3.0%)	7 (4.8%)	11 (3.9%)
	Expected count (f_e)	5.2	5.8	
Hotel and tourism	*Observed count (f_o)*	2 (1.5%)	3 (2.1%)	5 (1.8%)
	Expected count (f_e)	2.4	2.6	
Industrial technology	*Observed count (f_o)*	13 (9.8%)	8 (5.5%)	21 (7.5%)
	Expected count (f_e)	10.0	11.0	
Agriculturea	*Observed count (f_o)*	23 (17.3%)	7 (4.8%)	30 (10.8%)
	Expected count (f_e)	14.3	15.7	
Restaurant management and food	*Observed count (f_o)*	6 (4.5%)	9 (6.2%)	15 (5.4%)
	Expected count (f_e)	7.2	7.8	
HVAC and property maintenance	*Observed count (f_o)*	4 (3.0%)	2 (1.4%)	6 (2.2%)
	Expected count (f_e)	2.9	3.1	
Health and social care	*Observed count (f_o)*	21 (15.8%)	34 (23.3%)	55 (19.7%)
	Expected count (f_e)	26.2	28.8	

[a] standardised residuals > 2.0 $\chi^2 = 42.07$; df = 11; $p < 0.001$

In competence Profile 2, the teachers were more likely to be women, and they had on average worked longer as vocational teachers compared to Profile 1 teachers. Profile 2 teachers were statistically significantly more likely to have a teaching and teacher certification in vocational and other subjects. Teachers in Profile 1 were more likely to have only upper secondary education as their highest education degree, and teachers in Profile 2 were more likely to have a degree from higher education. Finally, the teachers in competence Profile 2 were significantly more likely to work in the children and recreation programme and the business and administration programme (Table 4).

There were no statistically significant differences between Profile 1 and 2 regarding forms of employment, that is, permanent or temporary positions, or if they split their employment

between teaching and their basic vocation, but teachers in Profile 1 were more likely to be employed in a part-time position rather than full-time.

Vocational teachers under competence Profile 2 reported having developed all six areas of competence to a higher extent than teachers in Profile 1. While this is expected for teaching-related competence, including teaching competence, formal competence, administrative competence, collaborative competence, and competence in managing heterogeneous classrooms, it is not expected for vocational teaching competence. The longer working experience of teachers in Profile 1 could have contributed positively to them developing vocational teaching competence to a higher extent than teachers in Profile 2.

The questionnaire included a question in which the respondents were asked to rank the following categories of competence from most important (1) to least important (6): Teaching competence, vocational competence, professional development, interpersonal competence, collaboration with actors in the labour market, and administrative competence. The teachers in Profile 1 ranked vocational competence highest followed by teaching competence, interpersonal competence, professional development, collaboration with actors in the labour market, and administrative competence, in that order. The teachers in Profile 2 ranked teaching competence highest before vocational competence, followed by interpersonal competence, professional development, collaboration with actors in the labour market, and administrative competence, in the same order as the teachers in Profile 1.

5 Discussion

The current study aimed to identify competence profiles of vocational teachers in Sweden and analyse background factors that are associated with these competence profiles. The results indicated the presence of two competence profiles of vocational teachers that can be summarised as follows:

- Profile 1 consists of male vocational teachers with extended occupational experience and limited teaching experience. These vocational teachers are active in technical VET programmes (cf. Löfgren et al., 2022), are mostly employed in upper secondary schools, and report higher percentages of part-time contracts. They report lower achieved competence in all areas than vocational teachers in Profile 2.

- Profile 2 consists of female vocational teachers with longer teaching experience and more limited occupational experience. These teachers have higher percentages of formal teacher training (cf. Kristmansson & Fjellström, 2022), are to a higher extent employed in adult education centres, and come from vocational programmes associated with the service and care sector. These vocational teachers also have a higher

education level regarding their VET studies and report higher achieved competence in all areas compared to Profile 1.

Vocational teachers in Profile 2 rated all their achieved competences higher than teachers in Profile 1. Focusing on teaching competence specifically, vocational teachers with teaching certification rated their achieved teaching competence significantly higher than teachers without certification, and the same goes for their formal competence. These two results combined indicate a relationship between holding a teaching certificate and self-reporting higher competence. According to previous research, this may indicate lower confidence for vocational teachers in Profile 1 or lower actual competence (Antera, 2023a). Although this is a common limitation in self-reported data collection, further research could shed more light onto this blurry area.

Moving on to occupational experience and vocational competence, although teachers in Profile 1 have longer occupational experience, teachers in Profile 2 were shown to have higher self-reported vocational teaching competence. This could relate to the construction of the item in the current study. The vocation-related competence included in this survey did not concern actual vocational competence but vocational competence in the teaching process, meaning up-to-date vocational knowledge, finding quality workplace placements, and matching workplaces with students' needs. In that sense, teachers in Profile 2 have not reported higher vocational competence but higher vocational competence that has been recontextualised to benefit vocational teaching. In any case, this recontextualisation is considered very important in using the vocational knowledge and skills obtained before entering the school setting, not only for the practice of teaching, but also for the reshaping of the vocational teachers' identity (Antera, 2023b; Sarastuen, 2020).

As discussed in the two preceding paragraphs, teachers in Profile 1 demonstrated potentially lower confidence in their achieved teaching competence and also in their vocational competence that relates to teaching. This leads to concerns about how teachers in Profile 1 perceive their ability to recontextualise and translate their occupational experience into classroom knowledge (also in Antera et al., 2022; Sarastuen, 2020). Since vocational teachers in Profile 1 prioritise vocational competence over teaching competence, they probably feel confident with their actual vocational knowledge and skills, but not equally confident with connecting this knowledge to their teaching practice. Although it may not be possible to say with certainty whether this study presents actual lower competence or lower confidence among the teachers in Profile 1, competence development is considered helpful for the teachers with this competence profile. Further training activities, in school or in higher education institutions, can support more reflection on how previous knowledge and experience can be recontextualised and reshaped for students and for the context of formal education.

The above-mentioned competence profiles reflect previous research in the field of vocational teachers. Vocational teachers' profiles have previously been discussed in terms of the profile of the *occupational expert* versus that of the *vocational teacher* (Nylund & Gudmundsson, 2017). While this categorisation is representative of the teachers' prioritisation of what matters in vocational teaching, there is a series of factors that can form the basis for the reported differentiation, such as gender, time spent as a teacher, time spent in the vocation, or technical or more service-oriented disciplines. This study does not identify which factors have the greatest influence on preferences for specific competence areas. However, gender and gender dominance in vocational programmes could be further examined by exploring the intersectional dimensions of gender.

Another limitation of quantitative studies on vocational teachers in Sweden is the fact that some vocational areas (e.g., child and health care) are female dominated, while they have a higher percentage of teachers with university studies in their initial occupation. This makes it particularly demanding to clarify which of these factors accounts for the difference presented in the data (Andersson et al., 2018). Qualitative research has indicated, however, that vocational teachers from service-oriented sectors, such as education and health/social care, might find it easier to identify competence that the previous occupation and the teaching job have in common, making the transition to teaching a process with less tensions (Antera, 2022; Antera & Teräs, 2024).

Due to the tendency of moving VET closer to the labour market and its needs, the result that longer experience in the vocation does not seem to be considered particularly important in the teaching job is rather surprising. On the other hand, the teaching focus of the vocational teaching practice can explain this result. Previous research suggests that vocational teachers keep themselves up to date with their previous occupation while working as teachers. Vocational teachers remain in touch with their occupation via boundary-crossing activities that are part of vocational teaching, or they often go back to their occupation for shorter times during vacation periods (Andersson et al., 2018; Antera, 2023b). This leads to the conclusion that exercising different types of competence (vocational and teaching) in parallel is more beneficial than longer vocational experience followed by teaching practice. The participation in parallel activities should be further promoted for vocational teachers' development. The importance of incorporating both vocational and teaching-related elements into the professional development of vocational teachers has been highlighted in previous research. In their conference paper, Brevik et al. (2023) recommended that school-company networks, and their potential applications in VET, be included in teacher training to bridge the gap between practice and theory. Based on the findings of this study, it can be suggested that such initiatives could enhance the perceived value of vocational teachers' tasks that are more closely related to their vocation, helping to counteract the dichotomy between teaching and vocation, as well as between theory and practice.

6 Conclusion

This study has highlighted two dominant competence profiles of vocational teachers. Vocational teachers in Profile 2 have shown greater confidence in their self-reported professional competence. Several background factors have been associated with these two competence profiles. However, it is not possible to determine the causal effects of the relationships. This means that the competence profiles should not be used to categorise or label teachers. Nevertheless, they show that different groups of vocational teachers have different ways of learning and developing in terms of both competence and confidence. In other words, vocational teachers in Profile 1 might need further support in their professional development, or a different type of support. As Sartori et al. (2015) concluded, the first step when planning development activities should be the analysis of needs, since taking the training needs for granted can be a risk.

Previous research has shown that vocational teachers' continuous professional development in Sweden is often left to the teachers' own initiative and accompanied with only limited resources (Andersson & Köpsén, 2019; Antera, 2023b). Since vocational teachers maintain strong connections with their previous occupational identity, the shaping and strengthening of the vocational teacher identity should not be left to the individuals. Instead, the responsibility for vocational teachers' continuous professional development should be placed on the schools. It should be offered in a planned and structured way and integrate various forms of participation and identification to match the diversity of experiences and profiles present in the group of vocational teachers.

Ethics Statement

This study adhered to the regulations of the Swedish Ethical Review Authority and fulfil the requirments of the IJRVET's ethical statement. The research project ensured that the requirements for informed consent was fulfilled.

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