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Exploring pre-service special needs teachers' assessment conceptions and assessment self-efficacy

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ABSTRACT

This survey study (N = 148) investigates the interrelationships between assessment conceptions, assessment self-efficacy, prior education, and teaching experience amongst Finnish pre-service special educational needs teachers (pre-service SENs). The results showed that assessment conceptions and assessment self-efficacy are intertwined. Assessment conceptions, prior studies, and teaching experience were clustered into three different pre-service SEN types: Assessment Positives, Assessment Cautious, and Assessment Criticals. Pre-service SENs with assessment-positive or assessment-cautious conceptions reported higher assessment self-efficacy than students with assessment-critical conceptions. Practical implications are discussed.

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KEYWORDS
Assessment conception; assessment self-efficacy; pre-service special educational needs teacher

Introduction

Special educational needs (SEN) teachers are often responsible for ensuring adequate support for learning and schooling (Takala et al. 2018), in which the role of assessment is to support decision-making to identify the need for support, to ensure that appropriate support is provided, and to monitor the effectiveness of support. Assessment-related competence is thus one of the key elements of SEN teacher education. Assessment competence is based on assessment knowledge and its implications, which are further filtered and interpreted via individual assessment-related conceptions (Xu and Brown 2016). These assessment conceptions guide teachers' assessment practices and decision-making (Hill and Eyers 2016). In addition, teacher assessment practices are affected by their self-efficacy in assessment (Zhang and Burry-Stock 2003). Both assessment conceptions (Smith et al. 2014) and assessment self-efficacy (Watson and Marschall 2019) may be shaped during teacher education, and they are also related to each other (Levy-Vered and Nasser-Abu Alhija 2015). In the current study, we aimed to investigate interrelationships between Finnish pre-service SEN teachers' assessment conceptions, assessment self-efficacy, prior education, and teaching experience.

Assessment conceptions of pre-service teachers

Assessment conceptions are based on individual, subjective understanding of assessment and include information, beliefs, and feelings (Brown 2008). Previous studies have focused strongly on assessment purposes, and shown that the most prominent purpose of

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assessment among teachers and pre-service teachers is to improve their teaching and students' learning (Brown 2008; Levy-Vered and Nasser-Abu Alhija 2018). However, these conceptions differ from assessment of learning to assessment for teaching and learning, and even to assessment as irrelevant (Barnes, Fives, and Dacey 2014, 2017; Brown 2008). Our previous studies show that pre-service SEN teacher assessment conceptions form three main factors: assessment of learning, assessment for teaching and learning, and assessment as a harmful action (Kyttälä et al. 2021). Assessment of learning reflects traditional summative assessment, where the focus is on the outcome (Black and William 1998). Assessment for teaching and learning, on the other hand, reflects formative assessment targeted to support the learning process, either via providing feedback for teaching or for learning (Frey and Schmitt 2007). Assessment as harmful includes both issues related to the workload of the teacher and issues related to the student (Kyttälä et al. 2021).

Previously, we observed that Finnish pre-service SEN teachers could be clustered into three pre-service teacher types with unique assessment conception profiles and amounts of prior studies and teaching experience (Kyttälä et al. 2021). These pre-service SEN teacher types resemble the assessor types observed amongst other teacher groups. The Assessment Positives were assessment-for-learning oriented and similar to the Pro-Formative Group of Brown's (2008) study as well as the Teaching- and Learning-Oriented Type in Barnes, Fives, and Dacey (2017). The Assessment Cautious, who exhibit a cautious or neutral assessment orientation, are comparable to the Traditionalists suggested by Brown (2008) and the Moderate Type identified by Barnes, Fives, and Dacey (2017). Finally, the Assessment Criticals, who display a negative assessment orientation, seemingly correspond to the Assessment as Irrelevant teacher type reported by Barnes, Fives, and Dacey (2017).

Assessment conceptions are shaped both by personal experiences as the subject of the assessment (Smith et al. 2014) and by experiences as assessor (Wilsey et al. 2020). Assessment conceptions may be shaped during teacher education (Levy-Vered and Nasser-Abu Alhija 2018; Smith et al. 2014; Xu and He 2019), and simultaneously they form the basis for adopting new assessment-related knowledge during the same time span (Levy-Vered and Nasser-Abu Alhija 2015). According to Xu and Brown (2016), the interaction between knowledge and the individual belief of that knowledge forms the cognitive dimension of assessment conceptions. They suggested that knowledge that is closer to existing conceptions is easier to adopt than knowledge that is further away. This process is also linked to previous emotional assessment experiences. The stronger these emotional experiences are, the more powerfully they maintain existing conceptions (Xu and Brown 2016).

Self-efficacy for assessment practices

Prospective teachers' growing assessment competence is also related to their conceptions of their own capabilities in assessment-related tasks and responsibilities. Self-efficacy refers to a person's beliefs about what she/he can do (Bandura 1986). Teacher self-efficacy may be further conceptualised 'as individual teachers beliefs in their own abilities to plan, organise, and carry out activities required to attain given educational goals' (Skaalvik and Skaalvik 2007), and it has been suggested to have a bi-directional relation to teacher practices and instructional quality (Holzberger, Philipp, and Kunter 2013). Thus, teacher self-efficacy affects teaching practices and takes shape based on experiences

gained in teaching situations. Even though teacher self-efficacy in general has aroused research interest (Poulou, Reddy, and Dudek 2019), teacher self-efficacy specifically for assessment activities has not gained much interest. It has, however, been observed that teacher assessment self-efficacy is related to their assessment practices (Zhang and Burry-Stock 2003), and assessment attitudes (Alkharusi 2009), even though contradictory results have also been presented (Ogan-Bekiroglu 2009). Teacher self-efficacy is skill-, task-, and domain-specific (Bong 2006). Thus, teacher self-efficacy in assessment-related practices may differ from that in other teaching-related areas. Even though SEN teacher self-efficacy has gained research interest (e.g. Sarıçam and Sakız 2014; Malinen et al. 2013; Viel-Ruma et al. 2010), assessment-related self-efficacy studies have not concentrated on SEN teachers.

Teacher self-efficacy has been suggested to strengthen during pedagogical studies (Velthuis, Fisser, and Pieters 2014; Watson and Marschall 2019), and teacher assessment self-efficacy has increased during assessment courses (Huai et al. 2006). However, teacher self-efficacy does not always increase during teacher education (Volante and Fazio 2007). Experiences of failure and the absence of verbal persuasion during practicum periods may even decrease it (Martins, Costa, and Onofre 2015). Similarly, experiences of success increase self-efficacy, and experiences of failure decrease self-efficacy beyond teacher education (Holzberger, Philipp, and Kunter 2013). Higher self-efficacy has been observed to be related to longer teaching experience (Velthuis, Fisser, and Pieters 2014), although contradictory results have also been shown (Guo et al. 2011). In fact, Klassen and Chiu (2010) suggested that teachers' self-efficacy beliefs strengthen at the beginning and middle stages of a career and weaken towards the end of a career.

SEN teacher education in Finland

The current study was undertaken at three Finnish universities. A master's degree is required to obtain a formal qualification to be a teacher or a SEN teacher. There is also the possibility for 60 ECTS (one year of study; https://ec.europa.eu/education/resources-and-tools/european-credit-transfer-and-accumulation-system-ects_en) SEN teacher training programme after completing a master's degree within another related discipline (such as a classroom teacher programme) and having a certain amount of teaching experience (minimum requirement varying between 12 and 18 months of full-time teaching).

Finnish universities do not share identical curricula for SEN education (Takala et al. 2015). However, their curricula share certain common key areas (reading, writing, mathematics, communication, socio-emotional challenges, teaching practice) (Hausstätter and Takala 2008), that also include integrated assessment-related contents. Separate courses dedicated to assessment are rare. An SEN education programme seeks to prepare SEN teachers for their work, which includes teaching, consulting, and background duties (Takala et al. 2009), all of which are linked to the ideology and paradigm of continuous assessment of learning progress and the effectiveness of the provided support. The Ministry of Education and Culture defines the national educational standards, including for assessment, which schools locally implement in their curricula (www.minedu.fi). Municipalities, schools, and teachers have relatively broad autonomy in interpreting the law and national guidelines.

Current study

First, using a variable-centred approach, we investigated how pre-service SEN teachers' assessment conceptions are related to assessment self-efficacy, and how pre-service teachers with different educational and professional backgrounds (Master's students vs. Diploma students) differ in assessment conceptions and assessment self-efficacy. Our previous results suggest that pre-service SEN teachers with a prior teacher qualification (class teacher or subject teacher) are more cautious about assessment and hold more traditional assessment conceptions than students without a previous qualification (Kyttälä et al. 2021), and differences between these two groups should therefore be analysed as well.

Second, using a person-centred approach, we investigated how pre-service SEN teachers' assessment conceptions, prior academic studies in special education, and teaching experience together cluster into different patterns representing different pre-service teacher types, and we considered whether the similar profiles of Assessment Positives, Assessment Cautious, and Assessment Criticals, which we observed in our previous study (Kyttälä et al. 2021), could be repeatedly identified via cluster analysis in another set of data. We also investigated how these pre-service teacher types differ in assessment self-efficacy. If assessment conceptions and assessment self-efficacy are related as suggested (Levy-Vered and Nasser-Abu Alhija 2015), different teacher types that are clustered based on assessment conceptions should differ by assessment self-efficacy, as well.

We aim to answer the following research questions:

(1) To what extent are Finnish pre-service SEN teachers' assessment conceptions related to their assessment self-efficacy?
(2) To what extent do pre-service SEN teachers with different educational and professional backgrounds differ in assessment conceptions and assessment self-efficacy?
(3) What are the emergent pre-service SEN teacher types as defined by assessment conceptions, prior academic studies in special education and teaching experience?
(4) How do representatives of different pre-service teacher types differ in assessment self-efficacy?

This study extends previous studies in two ways. First, it aims to replicate our recent results (Kyttälä et al. 2021) concerning assessment conceptions of pre-service SEN teachers whose assessment conceptions have been rarely studied. Second, this study deepens our understanding of the relation between assessment conceptions and assessment self-efficacy, an issue that has been studied before (Levy-Vered and Nasser-Abu Alhija 2015) but not in the context of SEN teachers. Our recent results suggest that assessment conceptions of pre-service SEN teachers differ slightly from those of the other teacher groups (Kyttälä et al. In Press), which may also be reflected in the relation between assessment conceptions and self-efficacy. These results hold the potential to suggest improvements within SEN teacher education programmes within universities, not only in Finland but also elsewhere.

Methods

Participants and procedure

Pre-service SEN teachers (N = 148) participated in this study when they were accomplishing their SEN teacher studies at university. The exact response rate is not available, since the link was provided via course pages or email lists that reached other students as well. Sixty-six percent of the participants (n = 98) had a prior master's degree, including teacher qualification (class teacher or subject teacher), and they were thus completing their additional 60 study credits to qualify as SEN teachers within their diploma programmes (from hereon: Diploma students). The rest of the participants (n = 50; 34%) were currently completing their master's degree (from hereon: Master's students). There were 135 females (91%). This corresponds to the typical proportion of females (85%) and males in SEN teacher studies (Honkala and Komppa 2020). The respondents' ages varied from 19 to 57 (Median = 32 y). The participants were recruited from three Finnish universities, at which a total of 390 students start their SEN teacher studies each year.

The data were gathered via a web-based questionnaire, the link to which was provided via course pages on the Moodle learning platform or by email. Participation was voluntary. All participants signed an informed consent form before participation.

Online questionnaire

The online questionnaire included items on the teachers' background characteristics, such as age (in years), the amount of previous study in the field of special education (no previous study units, basic studies 25 ECTS, intermediate studies 35 ECTS, and advanced studies 70–90 ECTS), and teaching experience (both general and special education teaching included but not specified) in years. Student type (Master's student, Diploma student) was also included.

Assessment conceptions were measured with 18 items (see Table 1 for item descriptions), of which 16 were from our previously used questionnaire (see also Kyttälä et al. 2021; in Press). The two new items were included to tap into the disadvantages of assessment from the teacher's point of view. Nine of the items were selected from Brown's (2004) COA-III Instrument (Teachers' Conceptions of Assessment). The other nine of the statements were constructed in co-operation with Finnish experts of special education, assessment, and didactics, and based on the national standards of assessment in education (www.minedu.fi) to complement the special educational perspective and Finnish context. The statements represented the assessment of learning, assessment for teaching and learning, assessment as harmful for students, and assessment as harmful for the teacher. The participants were asked to determine what they thought about certain statements that addressed assessment on a scale from 1 to 7, where 1 meant 'completely disagree' and 7 meant 'completely agree'.

Assessment self-efficacy was measured with 16 items that were developed for this particular study, and based on relevant research literature (see Table 2 for item descriptions). The statements represented self-efficacy for summative assessment, self-efficacy for

Table 1. Confirmatory factor analysis for the assessment conception scale.

Items	Factor 1	Factor 2	Factor 3	Factor 4
*Assessment helps students improve their learning.	.775			
*Assessment modifies the ongoing teaching of students.	.835			
Assessment provides information on different learning needs.	.885			
Assessment guides planning of teaching.	.548			
Assessment provides information on how the support provided has benefited the student.	.676			
*Assessment provides feedback to students about their performance.	.651			
*Assessment is integrated with teaching practice.	.635			
*Assessment allows different students to get different instruction.	.741			
*Assessment establishes what student have learned.		.707		
Assessment predicts student performance.		.624		
*Assessment identifies student strengths and weaknesses.		.698		
*Assessment is unfair.			.798	
Assessment negatively affects students' perceptions of themselves.			.686	
Assessment exposes students to compare each other's performance.			.680	
Assessment takes up too much teachers' work time.				.537
*Assessment interferes with teaching.				.861
Assessment makes it difficult to implement guidance and teaching.				.697

Factor 1: Assessment of learning; Factor 2: Assessment for teaching and learning; Factor 3: Assessment as harmful for student; Factor 4: Assessment as harmful for teacher.* = The item is from Brown's (2004) COA-III Instrument.

Table 2. Confirmatory factor analysis for the self-efficacy assessment scale.

Items	Factor 1	Factor 2	Factor 3	Factor 4
I can identify students' learning needs.	.833			
I can assess student performance.	.840			
I can assess how well students have achieved learning goals.	.740			
I can use assessment to develop my teaching.		.714		
I can use assessment to help students identify skills that still require practice.		.739		
I can use assessment to support students' learning.		.852		
I can use assessment to support my own work.		.819		
I can assess fairly and equitably.			.789	
I can encourage students through assessment.			.645	
I can design assessment practices according to age and potential.			.764	
I can assess using varied assessment methods.			.708	
I trust my own assessment skills.			.865	
I trust my opportunities to develop as an assessor.			.660	
I tend to avoid assessment responsibilities.				.895
Assessment situations cause me anxiety or stress.				.599
I do not like tasks related to assessment.				.712

Factor 1: Self-efficacy for summative assessment; Factor 2: Self-efficacy for formative assessment; Factor 3: Overall self-efficacy in assessment; Factor 4: Assessment avoidance.

formative assessment, overall self-efficacy in assessment and assessment avoidance. The participants were asked to determine how well the statements described themselves on a scale from 1 to 7, where 1 meant 'completely disagree' and 7 meant 'completely agree'.

Analysis

First, descriptive statistics were calculated for demographic variables. Second, confirmatory factor analysis (CFA) using Amos 26.0 was conducted to test the four-factor structure for assessment conceptions. The CFA lends acceptable support (Hooper, Coughlan, and Mullen 2008; Steiger 2007) to the structure (CFI = .96, RMSEA = .06; Table 1): 1. *Assessment for*

teaching and learning (α = .90; eight items), 2. *Assessment of learning* (α = .72; three items), 3. *Assessment as harmful for student* (α = .77; three items) and 4. *Assessment as harmful for teacher* (α = .74; three items). One of the original items of the assessment of learning was removed from the final model because it loaded on several factors, which suggests that the item was interpreted differently by different respondents. Thus, the final model included 17 items altogether. Regression-based factor scores for these four factors were saved as composite scores for subsequent use. Third, CFA was conducted to test the four-factor structure for assessment self-efficacy. The CFA lends acceptable support to the structure (CFI = .98; RMSEA = .05; Table 2): 1. *Self-efficacy for summative assessment* (α = .84; three items), 2. *Self-efficacy for formative assessment* (α = .86; four items), 3. *Self-efficacy for overall assessment* (α = .88; six items), and 4. *Assessment avoidance* (α = .75; three items). Regression-based factor scores for these four factors were saved as composite scores for subsequent use. Fourth, descriptive statistics and correlations for these composite scores for assessment conceptions and assessment self-efficacy were calculated, and between-pre-service teacher groups (Master's students vs. Diploma students) differences in assessment conceptions and assessment self-efficacy were analysed using independent-samples t-test. Fifth, to identify the different pre-service teacher types, cluster analysis was conducted using the K-means method, which is suggested to work well in small-to medium-sized data (Han, Kamber, and Pei 2011). The purpose was to differentiate homogenous groups of pre-service teachers by clustering both four assessment conception factors, prior teaching experience, and prior theoretical studies in the field of special education. All six variables (four assessment conception factors, prior teaching experience, and prior studies) described order and magnitude, which made them suitable for K-means analysis (see Ruff 2014). The number of clusters was determined by inspecting the results of hierarchical cluster analysis (dendogram and agglomeration schedule; e.g. Gore 2000) and by testing three- and four-cluster solutions. The three-cluster solution was preferred because it was theoretically interpretable, in concordance with the solution presented by Kyttälä et al. (2021), and supported by the agglomeration schedule. Sixth, to further test the fit of the cluster solution, discriminant analysis was conducted. Finally, to investigate whether the pre-service teacher profiles differed by assessment self-efficacy or by pre-service teacher group, MANOVA with assessment self-efficacy factors as dependent variables was conducted, and a chi-squared test for independence between clusters and the pre-service teacher group was calculated.

Results

Descriptive statistics, correlations, and differences between pre-service teacher groups

For descriptive statistics for demographic variables and composite scores, see (Table 3). The distributions of the composite scores met the criteria for normality. The associations between assessment conceptions and assessment self-efficacy were determined with Pearson correlation analysis (see Table 4). Assessment conceptions correlated significantly with assessment self-efficacy. '*Assessment of learning*' and '*Assessment for teaching and learning*' correlated positively with '*Self-efficacy for summative assessment*', '*Self-efficacy for formative assessment*' and '*Self-efficacy for assessment in general*', and negatively with

'*Assessment avoidance*'. '*Assessment as harmful for student*' and '*Assessment as harmful for teacher*' correlated positively with '*Assessment avoidance*' and negatively with other self-efficacy composite scores.

There were significant pre-service teacher group differences in assessment conceptions and in assessment self-efficacy. Diploma students had higher scores in the '*Assessment for teaching and learning*' and lower scores in the '*Assessment as harmful for student*' than Master's students. There were no significant differences in '*Assessment of learning*' or in '*Assessment as harmful for teacher*'. Diploma students had higher scores in '*self-efficacy for summative assessment*', '*self-efficacy for formative assessment*', and '*self-efficacy for assessment in general*' than Master's students. There was no significant group

Table 3. Descriptive statistics of the variables.

	All participants (N = 148)				Master students (N = 50)		Diploma students (N = 98)			
Measures	M	Sd	Skew	Kurt	M	Sd	M	Sd	t	Cohen's d
Studies is special education	1.20	.72	.38	.19	1.24	.82	1.18	.66	.47	.09
Teaching experience	6.84	8.12	.96	−.36	2.71	5.76	8.94	8.34	−4.74***	−.82
Assessment of learning	.000	.721	−.648	2.092	−.138	.772	.071	.686	−1.68	−.29
Assessment for teaching and learning	.000	.734	−.977	1.877	−.236	.825	1.205	.655	−2.87**	−.50
Assessment as harmful for student	.000	1.176	.048	−.361	.352	1.213	−.180	1.120	2.66**	.46
Assessment as harmful for teacher	.000	.731	.387	−.264	.139	.769	−.071	.704	1.67	.29
Summative self-efficacy	.000	.900	−1.048	1.688	−.561	1.027	.286	.670	−5.29***	−1.05
Formative self-efficacy	.000	.785	−.869	1.095	−.480	.873	.245	.608	−5.25***	−1.02
General assessment self-efficacy	.000	.901	−1.002	1.467	−.558	1.026	.285	.674	−5.26***	−1.04
Assessment avoidance	.000	1.357	.278	−.891	.246	1.303	−.126	1.374	1.58	.28

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

Table 4. Correlations between key variables.

Measures	1	2	3	4	5	6	7	8	9
(1) Assessment of learning	-								
(2) Assessment for teaching and learning	.627***	-							
(3) Assessment as harmful for student	−.281***	−.717***	-						
(4)Assessment as harmful for teacher	−.261**	−.634***	.880***	-					
(5)Summative self-efficacy	.364***	.360***	−.292***	−.219**	-				
(6) Formative self-efficacy	.301***	.354***	−.303***	−.217**	.947***	-			
(7) General assessment self-efficacy	.375***	.384***	−.328***	−.253**	.992***	.939***	-		
(8) Assessment avoidance	−.241**	−.334***	.486***	.483***	−.418***	−.386***	−.489***	-	
(9) Studies in special education	.046	.069	−.162	−.161	.017	.005	.040	−.148	
(10) Teaching experience	.120	.061	−.054	.006	.535***	.508***	.526***	−.166*	−.031

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

difference in '*assessment avoidance*'. The differences between teacher groups in composite scores remained after controlling for prior teaching experience and previous studies in special education (Pillai's Trace = .15, F (8, 130) = 2.76, $p < .01$, $\eta p^2 = .15$).

Pre-service SEN teacher types

Composite scores reflecting the assessment conceptions, and prior studies in special education and teaching experience clustered together in three different pre-service teacher types. Cluster profiles based on standardised z-scores are presented in (Figure 1). The first cluster (N = 51, 34.5%) represents pre-service teachers with above average scores in '*Assessment of learning*', high scores in '*Assessment for teaching and learning*', low scores in '*Assessment as harmful for student*', and '*Assessment as harmful for teacher*' (from here forth '*Assessment Positives*'). Typical for the pre-service teachers in the first cluster were higher amounts of prior theoretical studies in special education but minor teaching experience. The second cluster (N = 43, 29.1%) represents pre-service teachers with above average scores for '*Assessment of learning*', '*Assessment as harmful for student*', '*Assessment as harmful for teacher*', and near-average scores in '*Assessment for teaching and learning*' (from here forth '*Assessment Cautious*'). Typical of them were lower amounts of prior studies in special education and longer teaching experience. The third cluster (N = 47; 31.8%) represents pre-service teachers with low scores in '*Assessment of learning*' and '*Assessment for teaching and learning*', and high scores in '*Assessment as harmful for student*' and '*Assessment as harmful for teacher*' (from here forth '*Assessment Criticals*'). Typical of them were the average number of prior studies in special education and minor teaching experience.

Descriptive statistics of the cluster profiles are presented in (Table 5). The discriminant analysis confirmed the fit of the cluster solution (Wilks' $\lambda = 0.167$; $\chi 2 = 242.70$; df = 12; $p < .0001$). The cross-validated classification showed that, overall, 95.3% of the grouped cases were correctly classified. The MANOVA test confirmed that all the three clusters

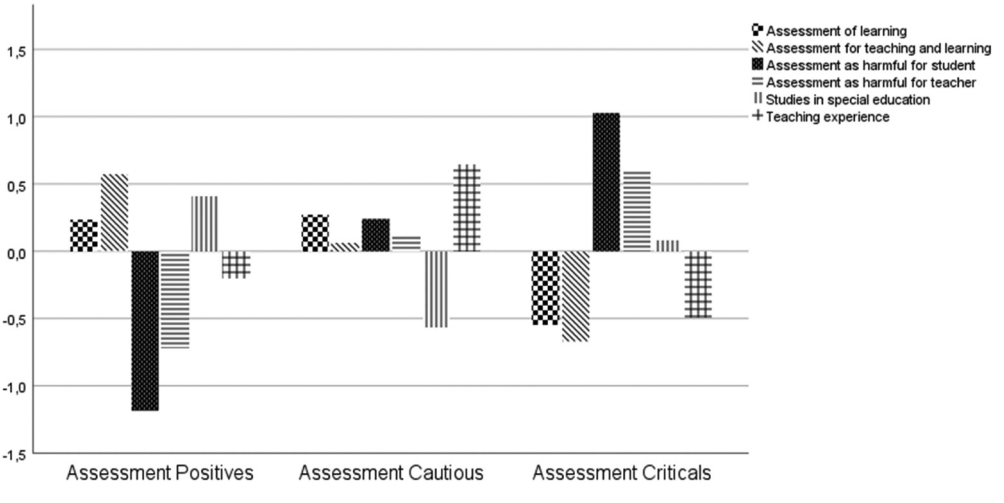

Figure 1. Z-scores of the cluster profiles.

Table 5. Descriptive statistics of the cluster profiles.

	1 Assessment Cautious (n = 43)		2 Assessment Positives (n = 51)		3 Assessment Criticals (n = 47)				
Measures	M	Sd	M	Sd	M	Sd	F	ηp2	Diff.
Assessment of learning	.267	.426	.232	.726	−.546	.634	26.028***	.274	1, 2 > 3
Assessment for teaching and learning	.063	.409	.568	.446	−.681	.679	69.546***	.502	2 > 1 > 3
Assessment as harmful for student	.240	.588	−1.184	.700	1.026	.792	125.360***	.645	3 > 1 > 2
Assessment as harmful for teacher	.128	.420	−.725	.331	.610	.584	108.471***	.611	3 > 1 > 2
Studies in special education	.791	.600	1.490	.644	1.255	.736	13.213***	.161	2, 3 > 1
Teaching experience	12.081	8.750	5.186	7.237	2.872	5.021	20.183***	.226	1 > 2, 3
Summative self-efficacy	.347	.687	.195	.760	−.612	.961	18.623***	.213	1, 2 > 3
Formative self-efficacy	.294	.632	.151	.684	−.486	.816	15.498***	.183	1, 2 > 3
General assessment self-efficacy	.328	.669	.236	.772	−.624	.956	19.572***	.221	1, 2 > 3
Assessment avoidance	−.047	1.107	−.712	1.233	.771	1.222	18.966***	.216	3 > 1 > 2

*** $p < .001$.

significantly differed in all assessment conception composite scores, prior special education studies, and prior teaching experience (Pillai's Trace = 1.14, F (12, 268) = 29.71, $p < .001$, ηp2 = .57; Table 5).

The one-way MANOVA showed that the clusters differed significantly in self-efficacy for assessment (Pillai's Trace = .35, F (8, 272) = 7.11, $p < .001$, ηp2 = .17; Table 5). The Assessment Criticals had significantly less self-efficacy for summative assessment, formative assessment, and assessment in general than the Assessment Cautious and Assessment Positives. All groups differed significantly in assessment avoidance, with the Assessment Criticals showing the highest and Assessment Positives showing the lowest scores. The group differences in self-efficacy scores remained the same after controlling for prior teaching experience and previous studies in special education (Pillai's trace = .24, F (8, 268) = 4.66, $p < .001$, ηp2 = .12). Based on crosstabs and a chi-squared test for independence, the two pre-service teacher groups were represented differently in three clusters ($\chi 2$ (2, 148) = 12.33**). Master's students (n = 26, 55.3%) were the most represented amongst Assessment Criticals, and Diploma students amongst Assessment Positives (n = 37, 72.5%) and Assessment Cautious (n = 33, 76.7%).

Discussion

First, we investigated how pre-service SEN teachers' assessment conceptions were related to assessment self-efficacy. In concordance with previous results showing an association between assessment conceptions and self-efficacy (Levy-Vered and Nasser-Abu Alhija 2015), all assessment conception factors were related to all assessment self-efficacy factors. Negative assessment conceptions were positively related to assessment avoidance, and negatively related to other self-efficacy factors, indicating that pre-service teachers with negative assessment conceptions often feel less competent in assessment and tend to avoid assessment-related tasks. On the other hand, a stronger orientation towards assessment of learning and assessment for teaching and learning also indicated

stronger self-efficacy in assessment. The results are in line with those of Levy-Vered and Nasser-Abu Alhija (2015), suggesting a relationship between assessment conceptions and assessment self-efficacy.

Second, we investigated how pre-service SEN teachers with different educational and professional backgrounds differed in assessment conceptions and assessment self-efficacy. The results showed that there were certain differences between Master's students and Diploma students. Diploma students, who had significantly more teaching experience and already a teacher qualification, were more oriented to assessment for teaching and learning, while Master's students saw assessment as more harmful for students. Diploma students also had significantly stronger assessment self-efficacy than Master's students. This is in line with studies showing that higher self-efficacy is related to longer teaching experience (Velthuis, Fisser, and Pieters 2014). However, even though one could assume that these differences between student groups were due to differences in teaching experience, this was not the case since the between-groups differences in assessment self-efficacy remained, even though both teaching experience and prior studies in special education were controlled for. This indicates that there are other possible intertwining factors contributing to these relationships, such as the pre-service teacher's own school-age assessment-related experiences (Ropo 2004), positive, or negative assessment experiences during teacher education (Martins, Costa, and Onofre 2015) or beyond that (Holzberger, Philipp, and Kunter 2013). It is also possible that part of the stronger assessment self-efficacy of Diploma students is simply a result of having already one teacher qualification, and having experience as a teacher responsible for own class/students, which creates a certain stronger sense of being competent in assessment regardless of actual teaching years.

Third, using a person-centred approach, we investigated what the emergent pre-service SEN teacher types were as defined by the assessment conceptions, prior academic studies in special education, and teaching experience. Fourth, how these teacher types differ in assessment self-efficacy was also considered. The results replicate our previous findings (Kyttälä et al. 2021), which suggest three different pre-service SEN teacher types: Assessment Positives, Assessment Cautious, and Assessment Criticals. These types differ in assessment self-efficacy as well. Assessment Positives emphasised assessment for teaching and learning and did not highlight the disadvantages of assessment. They resemble the Pro-Formative Group of Brown's (2008) study and the Teaching-and Learning-Oriented Type of Barnes, Fives, and Dacey (2017). Assessment Positives also showed the lowest levels of assessment avoidance. They typically had more prior studies in special education but had shorter teaching experience. The results suggest that the studies in special education support the formation of assessment-positive, formatively oriented, assessment conceptions. It seems to be typical for pre-service teachers in this group that they either are currently completing their first teacher qualification or have recently obtained their prior qualification, since they do not yet have a long teaching experience.

Assessment Cautious had near-average scores on every dimension, indicating cautious or neutral assessment orientation, which is in concordance with our previous study (Kyttälä et al. 2021). They emphasised assessment of learning, and noticed disadvantages of assessment moderately, as well. They resemble the Traditionalists suggested by Brown

(2008) or the Moderate Type suggested by Barnes, Fives, and Dacey (2017). Typical for this group was longer teaching experience, which may explain their cautious orientation. These cautious conceptions probably reflect the practical successful and unsuccessful assessment experiences they have had during their career. Since municipalities, schools and teachers have relatively broad autonomy in interpreting the law and national guidelines in Finland, assessment culture and assessment practices vary, and thus affect assessment conceptions of different teachers in different ways. In line with their neutral conceptions, this group showed more assessment avoidance than Assessment Positives but less assessment avoidance than Assessment Criticals.

Assessment Criticals showed pessimistic assessment orientation, reporting higher levels of student-targeted and teacher-targeted disadvantages of assessment. This is in line with our previous study (Kyttälä et al. 2021) and suggests that there is a group of pre-service SEN teachers with very negative assessment conceptions. They resemble the 'Assessment as Irrelevant' teacher type reported by Barnes, Fives, and Dacey (2017). Typical for them is a near-average amount of prior studies and minor teaching experience, which is connected to lower assessment self-efficacy compared to other groups. This is in concordance with the results showing that lower self-efficacy is related to shorter teaching experience (Velthuis, Fisser, and Pieters 2014). Thus, those pre-service SEN teachers who do not have long teaching experience, and who experience assessment as harmful for students and for teachers, do not feel competent in assessment-related tasks either.

Master's students were most represented amongst these Criticals, while Diploma students were most represented amongst Assessment Positives and Assessment Cautious. It is likely that these critical conceptions and low assessment self-efficacy take shape during later studies, at least to some extent, as teacher education is one of the key stages in shaping assessment-related conceptions and assessment skills (Smith et al. 2014; Xu and He 2019). Nevertheless, assessment-related conceptions and practices of in-service teachers continue to differ (Brown 2004; Remesal 2011). Thus, there are critical conceptions amongst experienced and qualified teachers as well. Negative assessment conceptions have previously been explained by strong negative emotional assessment experiences (Crossman 2007), which are suggested to maintain existing conceptions (Xu and Brown 2016). If, for example, a student has felt unfairly assessed during school, and if the experience has been dominant, it may be challenging to develop positive conceptions during teacher education. However, it is likely that there are other explaining factors behind critical conceptions, and these should be investigated more thoroughly in future studies.

There are certain limitations that should be acknowledged. First, the exact response rate was not available, since the link to the questionnaire was shared on Moodle platforms and email lists that were also available to students who were not our target group. Second, participation was voluntary, and thus based on participants' interest and willingness to respond, which may affect the results and representativeness of the data. Third, using teaching years as an only indicator of teaching experience may be too simplified in explaining variations in assessment conceptions and assessment self-efficacy. Future studies should investigate the quality of teaching experience, including professional context (general vs. special education) as well. Fourth, we do not yet know how assessment conceptions and self-efficacy change over the study years. This would also make an interesting setting for future studies.

Conclusion

Our results showed that assessment conceptions and assessment self-efficacy are intertwined. Pre-service SEN teachers with more assessment-oriented conceptions seem to have higher assessment self-efficacy than pre-service SEN teachers with assessment-negative conceptions. Even though our results suggest that assessment-positive and assessment-cautious conceptions and higher self-efficacy are related and typical for pre-service SEN teachers with prior teacher qualification, and assessment-negative conceptions are related to lower self-efficacy, and typical for Master's students with no prior teacher qualification, there are both between-teacher-group differences as well as within-teacher-group differences. Our results suggest that in both pre-service SEN teacher groups, the existing assessment conceptions are heterogeneous and vary from assessment-oriented and formatively oriented to more traditional, summatively oriented, or even anti-assessment-oriented.

Practical implications

Since assessment is intertwined with the work of a SEN teacher in many ways, one of the key aims of SEN teacher education is to support the development of adequate assessment skills. The results of this study show that pre-service SEN teachers have diverse starting points for this professional growth related to assessment. When planning curricula for SEN teacher education, it is important to keep in mind that students come to study from distinctive backgrounds, and this affects their professional growth during studies. In terms of assessment, SEN teacher studies should support the shaping of conceptions along the lines of the SEN teacher's work demands and national policy. This is particularly important since the policy-level approach to assessment within the profession of teachers and SEN teachers in Finland (see Sabel et al. 2011) has traditionally been among the loosest, and thus vulnerable to large differences in practice. In addition, the studies should support the strengthening of assessment self-efficacy. This presupposes that the studies include not only theoretical assessment-related knowledge, but also opportunities to have a sufficiently diverse range of successful assessment experiences during practical periods and adequate constructive feedback under guided conditions.

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