The revised Inventory Learning to Teach Process: Development of a questionnaire measuring how student teachers learn

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Abstract

One of the key tasks of teacher education (for primary and secondary education) is to support student teachers to develop competencies that enable teachers to continue professional learning, also after graduation. Two decades ago, the Inventory Learning to Teach Process (ILTP) was developed to get insight in student teachers' process of learning to teach. This self-report questionnaire measures with ten scales student teachers' learning and regulation activities, emotion regulation and conceptions of learning to teach. In this paper, we examine the construct validity of the Inventory Learning to Teach Process using state of the art techniques and develop a parsimonious version of the instrument. The dataset included 1,094 student teachers. Exploratory and confirmatory factor analyses were used to test the factorial structure of the instrument. A shorter 29-item version of the instrument was developed and resulted in good fit and scale reliabilities. The learning conception scales could not be retained in any form. This more parsimonious revised version of the ILTP (ILTP-R) can be used in future research to study the development of student teachers' way of learning over time. In addition, the ILTP-R gives practitioners the possibility to substantiate their feedback concerning how their student teachers approach their learning with validated and reliable measurements.

Keywords: learning to teach, teacher education, student teachers, questionnaire, validation

1 Introduction

The importance of active lifelong learning as part of being an expert teacher has often been mentioned (Clarke & Hollingsworth, 2002; Hammerness et al., 2005). Firstly, no matter how good student teachers' preparation is and how well they have done in their internship, the stage of being an expert teacher cannot be reached in pre-service programmes (Feiman-Nemser, 2001; Hammerness et al., 2005). Secondly, even experienced teachers have to continue learning as they have to deal with external factors, such as educational reforms, new technologies, and new learning theories which require teachers to reconsider their ideas and change their practices (Beijaard, Korthagen, & Verloop, 2007; Vermunt & Endedijk, 2011). Not all beginning primary and secondary school teachers have the learning conceptions and skills enabling them to learn from their daily practice – also after their initial training (Hagger, Burn, Mutton, & Brindley, 2008). Therefore, one of the key tasks of teacher education is to support student teachers developing the capacity to continue learning in the dynamic teaching environment (Hagger et al., 2008).

Following the principles of contingent teaching or scaffolding (van de Pol, Volman, & Beishuizen, 2011), a good and continuous diagnosis of current performance is crucial to give adaptive support in students' development. It is for teacher educators not easy to get a good insight in student teachers' conceptions and processes of learning to teach, as these evolve not only in the context of the university, but also at their practice school (Endedijk & Bronkhorst, 2014). About two decades ago, the Inventory Learning to Teach Process (ILTP) was developed for this purpose (Oosterheert, Vermunt, & Denessen, 2002). This self-report questionnaire measures three components of how student teachers learn to teach: their learning and regulation activities, emotion regulation activities and conceptions of learning to teach. The factorial structure of this

instrument was determined with principal components analyses, which was a commonly used explorative method at the time. However, as we nowadays qualify this as a more outdated analysis method (Schmitt, 2011), the purpose of this paper is to re-examine the construct validity of the ILTP using confirmatory factor analysis (CFA). At the same time, we aim to find out whether we can create a more parsimonious version of the instrument that will enable practitioners to use the instrument as a feedback tool in order to gain insight in individual differences in learning to teach. In addition, a shorter version will make the instrument more practical to carry out longitudinal studies on the development of student teacher learning across time.

2 Theoretical Framework

2.1 How student teachers learn to teach

Traditionally, the teacher education curriculum was characterised by a separation of theory and practice: a theoretical part being taught during lectures at the university and a practice component – often afterwards - in school placements where the academic knowledge could be applied (Grossman, Hammerness, & McDonald, 2009; Zeichner, 2010). This disconnection resulted in many student teachers feeling unprepared to start teaching after the pre-service programme, facing a severe practice shock and experiencing problems to survive in the classroom, because they did not know exactly how to apply in practice what they had learned at the teacher education institute (Darling-Hammond, 1999; Hagger & McIntyre, 2000; Korthagen, 2010). Nowadays, in many Anglo-American countries the dual model (Tynjälä, 2013) is used to organize practice placements in teacher education (Maandag, Deinum, Hofman, & Buitink, 2007; Zeichner, 2010). Although learning to teach in these dual learning programmes is better integrated with student teachers' teaching practice than in the traditional programmes, student teachers also need the capacity to learn from these experiences and to integrate them with theory. Hagger et al. (2008) stated that for student teachers who lack this capacity, the process of learning from experience can be seen as miseducative, since it reinforces the idea that one can learn to teach by a simple accumulation of practice. Scholars have suggested that an active and meaning-oriented way of learning is the most preferable way of learning for student teachers to learn successfully from these contexts and to prepare them for lifelong professional learning (Bakkenes, Vermunt, & Wubbels, 2010; Bronkhorst, Meijer, Koster, & Vermunt, 2011; Endedijk, Vermunt, Verloop, & Brekelmans, 2012; Hagger et al., 2008; Mutton, Burn, & Hagger, 2010; Oosterheert, 2001). This indicates that *how* student teachers learn plays an important role in *what* they will learn during the initial teacher education program and beyond.

How students learn during their initial Higher Education courses has been intensively studied from the students' approaches to learning perspective (Lonka, Olkinuora, & Mäkinen, 2004). The aim of this line of research is to unravel patterns of how students approach their learning. The original distinction of Marton and Säljö (1976) between surface and a deep levels of processing has inspired many researchers to further explore individual differences between students in how they learn. Next generations of models included next to students' cognitive processing activities also motivational components (Entwistle & Ramsden, 1983). In line with the students' approaches to learning framework, also the learning patterns theoretical framework was developed (Vermunt & Donche, 2017) that consisted of four components: 1) cognitive processing strategies, which are the learning activities students undertake to get better understanding or increase knowledge and skills; 2) metacognitive regulation strategies that students employ to plan, monitor and evaluate their learning processes; 3) the (metacognitive) conceptions (views, beliefs) students hold about learning; and 4) the affective component in the form of learning motivations or orientations that may include

the goal-orientation, motives and worries of the learner (Vermunt & Donche, 2017). In the same period, various study strategy inventories were developed to measure these components (Entwistle & McCune, 2004) and to identify patterns in students' responses across components. These learning patterns are defined "… as a coherent whole of learning activities that learners usually employ, their beliefs about learning and their learning motivation, a whole that is characteristic of them in a certain period of time" (Vermunt & Donche, 2017, p. 270). The relation between the elements is theorized as follows: the cognitive processing strategies are influenced by the metacognitive regulation strategies, which in turn are influenced by both the learning motivation or orientation and the learning conceptions (Vermunt & Donche, 2017; Vermunt & Endedijk, 2011). Outcomes of empirical studies resulted in an expansion of the original surface (later also called reproduction-oriented) pattern and the deep (or meaning-oriented) pattern with application-oriented and undirected learning patterns (Lonka et al., 2004). However, these studies and also the instruments that were developed, were all focused on how students learn in *academic* contexts, mainly on how they learn from course materials such as text books, while student teachers often learn to teach in dual educational programs in which structurally learning at an educational institute is combined with learning in and from practice (Endedijk & Bronkhorst, 2014). In addition, student teachers often face additional problems (Hammerness et al., 2005): the problem of what Lortie (1975) has called the 'apprenticeship of observation', namely having to deal with preconceptions of teaching based on their long experience as students in a classroom; the problem of enactment, referring to the difficulty for student teachers to put ideas and intentions into actions; and the problem of complexity, as teaching is a highly complex task, this involves reaching multiple goals at the same time, requiring multiple type of knowledge to be used and integrated (Hammerness et al., 2005). The existing learning patterns framework and corresponding instruments designed for academic contexts are therefore too narrow to cover the large variation in learning activities and challenges of student teachers, what led to the necessity to develop a new framework and instrument to unravel *how* student teachers learn to teach.

Departing from the students' approaches to learning perspective, Oosterheert systematically studied individual differences in how student teachers learn in dual contexts of teacher training, in which learning at the university is combined with learning in and from practice (Oosterheert, Vermunt, & Veenstra, 2002; Oosterheert & Vermunt, 2001; Oosterheert, Vermunt, & Denessen, 2002). She developed in three consecutive studies a conceptual framework for describing qualitative differences in how student teachers learn to teach that included three components: student teachers' (1) learning conceptions (or mental models of learning), (2) processing and regulation activities, as well as (3) more specific emotion regulation activities (Oosterheert, Vermunt, & Veenstra, 2002; Oosterheert & Vermunt, 2001; Oosterheert, Vermunt, & Denessen, 2002). As can be seen, this framework is well aligned to the learning pattern theoretical framework, with as a major difference that the learning activities are combined in one component with the metacognitive regulation activities and the motivational component has a narrower focus on the emotion regulation. The empirical studies with this framework on how student teachers learn to teach, took place in several Dutch dual pre-service teacher education programmes. As part of these studies, an inventory was developed (ILTP) to measure the three components of the framework on learning to teach (Oosterheert, Vermunt, & Veenstra, 2002; Oosterheert, Vermunt, & Denessen, 2002). In addition, also person-centred analyses were carried out that distinguished four different learning patterns (in earlier work this was called learning orientations, see Endedijk, Donche, and Oosterheert (2014) for a detailed explanation): an inactive or survival oriented way of learning, reproduction oriented learning, dependent meaning oriented learning and independent meaning oriented learning

Table 1
Construction of the original ILTP

Scale	Sample item	Number of items
Learning conceptions		
Practicing and Testing	Learning to teach is above all trying out different things in practice.	9
Strong self-determination in performance improvement	I think it is important that teacher educators and my mentor stimulate me to think about my teaching.	3
Raising consciousness under external control	I think that I am the best person to determine which aspects of my teaching still require attention.	7
Learning and regulation activities		
Proactive, broad use of the mentor	I ask my mentor why, according to him/her, certain things in my lesson happened in certain ways.	6
Independent search for conceptual information	I search for theoretical information by myself to improve my knowledge about teaching and related issues.	5
Actively relating theory and practice	The way I want to teach now is the result of constantly connecting theoretical knowledge to my teaching experiences.	5
Developing ideas/views through discussion	Through discussion with experienced teachers, I develop my own ideas about education.	5
Pupil-oriented evaluation criteria	I am particularly satisfied with a lesson when pupils' engagement during lessons signals that the subject matter has come across.	3
Emotion regulation		
Avoidance	I do not think about a lesson that went wrong.	5
Preoccupation	I am preoccupied with a lesson that has gone badly for at least a day.	4

(Oosterheert, Vermunt, & Veenstra, 2002; Oosterheert, Vermunt, & Denessen, 2002). In various follow-up studies in dual teacher education programs, comparable relations were found as in studies in the academic context between these learning patterns and their preferences for their future teaching environments (Donche & Van Petegem, 2005), and their sense of self-efficacy of teaching (Donche, Van Petegem, Struyf, & Vanthournout, 2009). In addition, across studies significant relations of student teachers' learning patterns were found with both student teachers' personal characteristics and contextual differences in teacher education programs (cf. Endedijk et al., 2014). A recent ILTP-study in Germany (Festner, Gröschner, Goller, & Hascher, 2020), for which the ILTP has been translated to German, also showed relations between students' learning patterns and their self-perceived competence: Student teachers with an avoiding pattern (comparable to the inactive, survival oriented pattern in the Dutch samples) not only reported in general the lowest self-ratings on their self-perceived competence, but also showed the lowest increase of their self-perception during their internships. Student teachers in learning patterns that included independent and meaning-oriented characteristics (in this study called the versatile learning pattern) showed the largest increase in self-perceived competence (Festner et al., 2020).

2.2 The development, structure and quality of the original ILTP

2.2.1 Development of the original ILTP

An important starting point for the measurement of student teachers' learning patterns was the phenomenographic interview study conducted by Oosterheert and Vermunt (2001). The interview statements of 30 student teachers were used to develop the

items of the first version of a closed-ended and self-report questionnaire, resulting in a set of 103 items (Oosterheert, Vermunt & Denessen, 2002). After a pilot study with 169 student teachers weak items (not contributing to the measurement of the construct) were removed and principal component analysis identified eight components: one component measuring a mental model (operationalizing the component 'learning conception'); five learning activities components and; two emotion regulation components. In a subsequent survey study, a version of 67 items was administered to 382 student teachers. Again, principal component analyses resulted in the removal of weak items, but this time, a factorial structure of three components describing different mental models was found in addition to the five components describing learning activities and two components describing emotion regulation. Based upon these studies, the 52-item version of the ILTP emerged and this version has been used unaltered in all subsequent studies (Oosterheert, Vermunt, & Veenstra, 2002).

2.2.2 Structure of the ILTP

The 52-item version of the ILTP measures three components of learning to teach: learning conceptions, learning and regulation activities and emotion regulation, with in total 10 components (see Table 1).

2.2.2.1 Learning conceptions. Learning conceptions were defined as the way student teachers conceive the nature and progress of knowledge and learning during learning to teach, and their own and others' role in this process. This dimension is measured by three factors. The factor *Practising and testing* captures the extent to which student teachers conceptualise learning to teach as practising while obtaining concrete teaching suggestions in practice, finding out what works and what does not. The primary role of teacher educators is to give them these practical suggestions. The factor *Strong self-determination in performance improvement* reflects a high preference by student teachers for self-regulation in determining what they need to improve in their teaching. The last factor, *Raising consciousness under external control*, mirrors the student teachers' desire that others help make them aware of their own teaching behaviour, how it might be improved and how teaching situations could be interpreted.

2.2.2.2 Learning and regulation activities. The learning and regulation activities include both cognitive processing activities and regulation of learning. The cognitive processing activities entailed the cognitive activities student teachers undertake in teacher education that directly lead to learning results. Regulation of learning was operationalized in these studies as the internal control of the student teacher to use and relate the different sources of information in teacher education (e.g., their own teaching practice, the teaching practice of others, information from educators, the literature, mentors, peers, pupils). The learning activities and regulation activities are measured with five different factors. *Proactive, broad use of the mentor* measures the extent to which student teachers use their mentor not only for practical suggestions but also for interpreting teaching situations. The second factor, *Independent search for conceptual information* measures to what extent student teachers recognise a problem and are independent and proactive in their search for conceptual information. The next factor, *Actively relating theory and practice*, refers to the activities that student teachers undertake to use conceptual information from others to interpret their own practice. The factor *Developing views/ideas through discussion* refers to the intentional use of experienced colleagues by the student teachers in developing their ideas and vision on teaching and to gain insights into alternative teaching methods. The last factor in this dimension is *Pupil-oriented evaluation criteria,* which refers to the criteria student teachers use to evaluate their teaching. It captures the extent to which student teachers use their pupils' well-being or learning outcomes as a reference.

2.2.2.3 Emotion regulation. Emotion regulation refers to how student teachers regulate their emotions with regard to negative teaching experiences (Oosterheert &

Vermunt, 2001). Two factors measure emotion regulation: *Avoidance* and *Preoccupation*. *Avoidance* is a recoded factor that refers to the extent to which student teachers avoid or approach the unpleasant experience of bad lessons. If they score low and, as a consequence, show less avoidance behaviour, they use negative lesson situations as a vital source of information for meaning making and learning. *Preoccupation* measures the extent to which students experience long and intense periods of worrying about negative teaching experiences. Others can have a role in taking their worries and low self-confidence away.

2.2.3 Quality of the ILTP

The factorial structure as described above was also confirmed with a replication of the principal component analysis of Oosterheert, Vermunt, and Veenstra (2002) in the cross-sectional study of Donche and Van Petegem (2005). The internal consistency of these factors varied across different studies (Donche, Endedijk, & van Daal, 2015; Donche & Van Petegem, 2005; Endedijk, Vermunt, Meijer, & Brekelmans, 2014): the three-item factor *Strong self-determination in performance improvement* turned out to be the weakest (range α: .54-.65) while the other two learning conception factors showed satisfactory internal consistency (range α: .69-.76). Most of the cognitive processing and regulation factors showed good internal consistency (Cronbach's alpha's .73-.89), except for *Pupil-oriented evaluation criteria* (range α: 57-.73). The emotion regulation factors were also found internally consistent across studies (Cronbach's alpha's .71-.87).

3 This Study

The framework of Oosterheert has been a strong foundation for research and practice on student teachers' learning in the teacher education community in the Netherlands and Belgium and was recently also introduced in Germany. Oosterheert, Vermunt, and Denessen (2002) used varimax rotated principal component analysis to test the factorial structure, but CFA gives the opportunity to test the existing model and is currently seen as a superior method (Schmitt, 2011) to test the construct validity of the ILTP. In this study, we will examine the internal consistency and validity of the ILTP using both the original data set, which led to the ILTP questionnaire, as well as new large-scale data sets collected in the Netherlands and Belgium. The main question is: *To what extent is the Inventory Learning to Teach Process a valid and reliable instrument to measure how student teachers learn?* In case the instrument needs to be revised, we strive to develop a more parsimonious set of items to increase usability for research and practice.

4 Method

4.1 Samples

For this formal validation study, multiple data sets were used that had been collected in previous studies. In total, five data sets were used. Basic details about the data sets can be found in Table 2. The original data set was collected by Oosterheert, Vermunt, and Veenstra (2002), on which the current version of the ILTP has been developed. In this study, this data set will be referred to by 'original sample' and includes students from postgraduate university programs (UP) and higher vocational education programs (VP). The other four data sets were collected at four different teacher education institutes: two Belgian (BE) samples and two samples from the Netherlands (NL). The Dutch samples and one Belgian sample were collected at one-year postgraduate UP, which prepare students for teaching in higher-level secondary schools. The other Belgian data set was collected at a three-year higher VP that prepares students for teaching in lower-level secondary schools and for primary education. All data were collected in the last semester of their final year of study, when the student teachers already had some substantial teaching experience as an intern or apprentice (a 12-week full-time internship period or at least 100 teaching hours). The total dataset consisted of 1,094 unique respondents.

Table 2
Description of the data sets

Data set	Country	Type of program	Respondents and response rate (%)	Gender (% woman)	Age
Original	NL	UP+VP*	382 (68,9 %) of which 82 in UP	73 %	75.7 % between 20-24 years
A	NL	UP	69 (76.7 %)	70.4 %	*M* = 25.9 years (*SD* = 3.96)
B	NL	UP	83 (75,5 %)	58.2%	unknown
C	BE	UP	195 (unknown%)	71.1%	*M*= 25.45 years (*SD* = 6.29)
D	BE	VP	365 (unknown%)	82.6%	*M* = 22.17 years (*SD* = 2.04)

*UP= post-graduate university programme, VP= higher vocational education programme

Table 3a
Fit indices for model 1 (learning conceptions), model 2 (learning and regulation activities) and model 3 (emotion regulation) (n = 416)

	Model 1 - LC	Model 2 – LA	Model 3 – ER
chi² (*df*)	437.805 (149)	425.059 (242)	81.299 (26)
P	.000	.000	.000
CFI	.741	.932	.919
RMSEA 95% CI (*p*)	.071 .064-.079 (.000)	.044 .037-.051 (.932)	.075 .057-.093 (.014)
SRMR	.074	.050	.054

CI = confidence interval, LC = learning conceptions, LA = learning and regulation activities, ER = emotion regulation

4.2 Instrument

The same 52-item version of the ILTP was used in all the data sets (see also the description above and the Appendix for the set of items). The original Likert scale ranged from 1 (not true of me) to 5 (true of me). However, in sample A and B a Likert scale was used ranging from 1 (not true of me) to 7 (true of me) in order to increase the sensitivity for changes throughout the program (Dawes, 2008), as these measurements were part of a longitudinal study.

4.3 Procedure and Analyses

First, we tried to reproduce the factorial structure of the ILTP on the original data set using state of the art analysis techniques. As the outcomes showed that modifications were necessary, the instrument was validated on data sets A-D in a second phase.

4.3.1 Phase 1: CFA on the original data set

We tested the present factorial structure of the ILTP on the original data set. As previous research (Oosterheert, Vermunt, & Veenstra, 2002) points to the interrelatedness of the various factors that represent each component, these interfactor correlations were added to the measurement model. Separate CFA's were conducted to check the factorial structure of the learning conceptions (model 1), learning and regulation activities (model 2) and emotion regulation (model 3) scales. Model fit was tested using three fit indices: CFI (> .95), RMSEA (< .06) and SRMR (< .08) (Hu & Bentler, 1999; Marsh, Hau, & Wen, 2004). The fit indices for the three models are summarized in Table 3a.

As shown in Table 3a, model 1 fits the data poorly. Although SRMR is acceptable, both CFI and RMSEA point to an unacceptable fit. Model 2 and model 3 render an acceptable fit. CFI's of both models are only slightly below the cut-off value of 0.95, SRMR's indicate good fitting models and RMSEA is good for model 2 and acceptable for model 3. Tables

Table 3b
Learning and regulation activities: standardized parameters and interfactor correlations (n = 416)

	Mentor	Ind. search	Relating	Developing	Evaluation
Q20	.698***				
Q23	.697***				
Q26	.597***				
Q39	.530***				
Q40	.781***				
Q43	.758***				
Q27		.743***			
Q31		.688***			
Q34		.710***			
Q41		.520***			
Q42		.592***			
Q21			.609***		
Q25			.586***		
Q32			.739***		
Q35			.713***		
Q38			.642***		
Q24				.664***	
Q28				.477***	
Q30				.676***	
Q33				.594***	
Q37				.730***	
Q22					.465**
Q29					.874*
Q36					.678**
Mentor	1				
Ind. Search	.217***	1			
Relating	.138*	.560***	1		
Developing	.242***	.341***	.124	1	
Evaluation	.057	-.079	-.023	.058	1

*$p \leq .05$, **$p \leq .01$, ***$p \leq .001$; Mentor = proactive, broad use of the mentor; Ind. Search = independent search for conceptual information; Relating = Actively relating theory and practice; Developing = developing ideas/views through discussion; Evaluation = pupil-oriented evaluation criteria

3b and 3c give an overview of the standardized parameters and interfactor correlations for model 2 and model 3.

In sum, these analyses confirm the factorial structure of the learning and regulation activities and emotion regulation dimensions as established in Oosterheert, Vermunt, and Denessen (2002), but fail to replicate the factorial structure of the learning conception dimension.

4.3.2 Phase 2: EFA and CFA on new data sets A-D

A two-step procedure was used. First, we followed the advice of Schmitt (2011) to follow up a poor-fitting CFA model with an

Table 3c
Emotion regulation: standardized parameters and interfactor correlation (n = 416)

	Avoidance	Preoccupation
Q45R	.729***	
Q47R	.601***	
Q48	.426***	
Q49R	.424***	
Q51R	.661***	
Q44		.709***
Q46		.612***
Q50		.450***
Q52		.711***
Preoccupation	-.435***	

***$p \leq$ 0.001; R = recoded item

exploratory factor analysis (EFA). To account for the differences in the number of answer categories, samples were standardized before merging the samples A-D into one data set. This merged data set was split in half to enable running EFA on the first half (sample 1). Second, CFA on the second half (sample 2) was used to confirm the factor structures found.

EFA (maximum likelihood estimation) with oblique geomin rotation was conducted to explore the factor structure of the ILTP on sample 1. Geomin rotation was chosen, because it reduces cross-loadings which reflects CFA (Schmitt & Sass, 2011). Factor retention should be based on different criteria (Henson & Roberts, 2006). We used parallel analysis (see Dinno, 2009), scree plot (Cattell's elbow), eigenvalues, fit indices (see Fabrigar, Wegener, MacCallum, & Strahan, 1999) and theoretical interpretation to determine the number of factors to retain. Items were removed if any of the following cases apply: the highest significant factor loading in the pattern matrix is smaller than 0.3, there is more than one significant factor loading higher than 0.3 in the pattern matrix or the difference between the highest factor loading and the second highest loading is smaller than 0.15 in the pattern and/or structure matrix (Hair, Anderson, Tatbam, & Black, 1998; Worthington & Whittaker, 2006). After removal of items, a new EFA was performed on the remaining items. For the CFA, we used the same criteria as in phase 1. All analyses were performed using Mplus (version 7.11, Muthén & Muthén, 1998-2015), except for the parallel analysis, which was carried out using the R-package psych (Revelle, 2014).

5 Results

5.1 EFA on learning conception scales

To re-establish the factor structure of the learning conception scales, we performed an EFA on the 19 learning conception items. The initial EFA rendered a 5-factor solution. However, applying the criteria for item retention resulted in deletion of 9 items yielding two factors with only 1 item loading. The remaining 3 factors had mediocre internal consistency (α = .62 - .71). The second EFA on the remaining items confirmed the 3-factor solution. Again, 3 items failed to meet the criteria for retention and the internal inconsistency of 2 factors was mediocre (α = .60 - .72). After the second EFA only 7 items remained. The factorability of 4 items turned out to be too poor to continue with EFA. Consequently, we decided to withhold from further EFA and failed to establish an acceptable factor structure of the learning conception scales.

5.2 EFA on learning and (emotion) regulation scales

Although the factorial structure of the learning and regulation and emotion regulation scales rendered an acceptable fit when analyzed separately, we decided to perform an EFA on all factors at once. Two arguments support this decision: the close connection between the general regulation activities and the emotion regulation factors and our aim to strive for a more parsimonious version of the ILTP.

The first EFA we carried out on the complete set of 33 items resulted in inconclusive outcomes for factor retention. Parallel analysis suggested a four-factor solution, the inspection of the scree plot a six-factor solution and the Eigenvalues an eight-factor solution. To clarify the number of

Table 4a
Fit indices for models with 4 to 8 factors (initial EFA) (n = 357)

	4 factors	5 factors	6 factors	7 factors	8 factors
AIC	30468.390	30227.354	30083.824	29914.128	29881.998
Adjusted BIC	30603.801	30383.218	30259.436	30108.782	30094.989
chi² (*df*)	1209.330 (402)	910.294 (373)	710.764 (345)	487.068 (318)	402.938 (292)
p	.000	.000	.000	.000	.000
RMSEA 95% CI (*p*)	.075 .070-.080 (.000)	.064 .058-.069 (.000)	.054 .049-.060 (.096)	.039 .032-.045 (.998)	.033 .024-.040 (1.000)
CFI	.799	.866	.909	.958	.972
SRMR	.055	.045	.034	.026	.023

CI = confidence interval

Table 4b
Fit indices for models with 4 to 7 factors (second EFA) (n = 357)

	4 factors	5 factors	6 factors	7 factors
AIC	26814.942	26624.808	26477.335	26346.946
Adjusted BIC	26933.428	26760.925	26630.378	26516.210
chi² (df)	961.522 (296)	721.387 (271)	525.914 (247)	349.525 (224)
p	.000	.000	.000	.000
RMSEA 95% CI (*p*)	.079 .074-.085 (.000)	.068 .062-.074 (.000)	.056 .050-.063 (.061)	.040 .031-.047 (.986)
CFI	.808	.870	.919	.964
SRMR	.056	.048	.035	.025

CI = confidence interval

factors to retain, we inspected the fit indices for different solutions varying the number of factors from 4 to 8 (see Table 4a). The fit indices for the models with 6 to 8 factors indicated an acceptable fit. We inspected the pattern of factor loadings for each acceptable solution and decided to retain the solution with 7 factors. This solution fitted our theoretical expectations best and avoided factor collapse (as in the 6 factor-solution) or a factor consisting of only 1 item (as in the 8 factor-solution). Further inspection of the 7 factor-solution revealed that 4 items did not meet all the criteria for inclusion: items Q24 and Q35 were removed because they have two significant loadings > .3, item Q26 did not have any loading > .3 and the two highest loadings in the structure matrix of items Q25 and Q24 differed less than .15. Inspection of the content of these items showed that these results could be explained, as two items were phrased in a very broad way (Q25, Q26), one item referred to a specific learning activity that is not common behavior for a beginning teacher (Q24), and one item had a high chance of social desirable answers (Q35).

A second EFA with oblique geomin rotation was conducted on the remaining 29 items. Again, the different factor retention criteria indicated various numbers of factors to retain: parallel analysis suggested four factors, scree plot six or seven factors and the Eigenvalues seven factors. However, the fit indices (see Table 4b) clearly pointed at a 7 factor-solution. The pattern matrix of the final solution and the Cronbach's α of the factors are given in Table 4c. All factors mirrored the original scales, and all items that were included in the analysis loaded on their original factor (see also Figure 1). The first five factors in Table 4c reflect the learning and regulation dimension. The *proactive,*

Table 4c
Learning and (emotion) regulation activities: pattern matrix (n = 357)

	Mentor	Ind. search	Relating	Develo-ping	Evaluation	Avoid	Preoc
Q20	**.585***	-.037	.092	.113	-.023	.060	.038
Q23	**.754***	.086	.040	-.006	.003	.026	.033
Q39	**.449***	-.037	.050	-.087	.207*	-.141*	-.139*
Q40	**.679***	.024	-.078	.018	.060	-.163*	-.046
Q43	**.741***	.139*	-.085	.024	-.063	-.070	.014
Q27	-.044	**.627***	.213*	.069	-.025	.065	.030
Q31	-.004	**.835***	.027	-.043	.019	.042	-.006
Q34	.027	**.829***	-.015	-.015	-.003	.013	-.036
Q41	.097	**.531***	.017	.119	.028	-.068	.022
Q42	.081	**.514***	.064	.113	.076	-.068	.072
Q21	.166	.002	**.717***	.025	.031	.011	.032
Q32	-.099	.270*	**.611***	.017	.010	-.030	-.039
Q38	.032	.170*	**.557***	-.029	-.041	-.047	-.029
Q28	.121	-.101	.000	**.666***	.026	-.052	.006
Q30	-.090	.081	.021	**.783***	.003	.000	-.006
Q33	.062	.174*	.008	**.578***	-.087	.025	-.062
Q37	.002	.010	-.004	**.737***	.055	.014	.025
Q22	.111	-.175*	.114	-.085	**.448***	.039	.099
Q29	-.067	.016	-.036	.041	**.738***	-.080	-.019
Q36	.009	.097	-.014	.052	**.709***	.028	-.027
Q45R	-.055	-.031	.090	-.013	-.116	**.507***	-.029
Q47R	-.127*	.078	-.050	-.017	.040	**.753***	.109*
Q48	.141*	-.018	-.007	.045	-.073	**.539***	-.078
Q49R	-.043	-.053	.041	.071	-.099	**.476***	-.035
Q51R	.020	.004	-.027	-.068	.052	**.815***	-.028
Q44	-.046	.067	-.026	.011	-.030	-.035	**.800***
Q46	.113	-.028	-.039	-.041	.001	.030	**.592***
Q50	.253*	-.129	.047	.041	.105	.013	**.487***
Q52	-.021	.009	.012	-.032	-.026	-.237*	**.647***
α	.810	.844	.736	.808	.654	.764	.737

*$p \leq .05$, **$p \leq .01$, ***$p \leq .001$; Highest significant factor loadings in bold; R = recoded item; Mentor = proactive, broad use of the mentor; Ind. Search = independent search for conceptual information; Relating = Actively relating theory and practice; Developing = developing ideas/views through discussion; Evaluation = pupil-oriented evaluation criteria; Avoid = avoidance; Preoc = preoccupation; *α* = Cronbach's *α*

broad use of the mentor-factor now consists of five items, as item Q26 was removed during the first EFA. From the factor *actively relating theory and practice* two items were removed (Q25, Q35), resulting in a three-item factor in the revised version. The factor *developing ideas/views through discussion* consists now of four items, as one item (Q24) was removed in the previous step. The other factors remained unaltered.

5.3 CFA Results

In a second step we tested the factorial structure of the ILTP obtained by EFA on

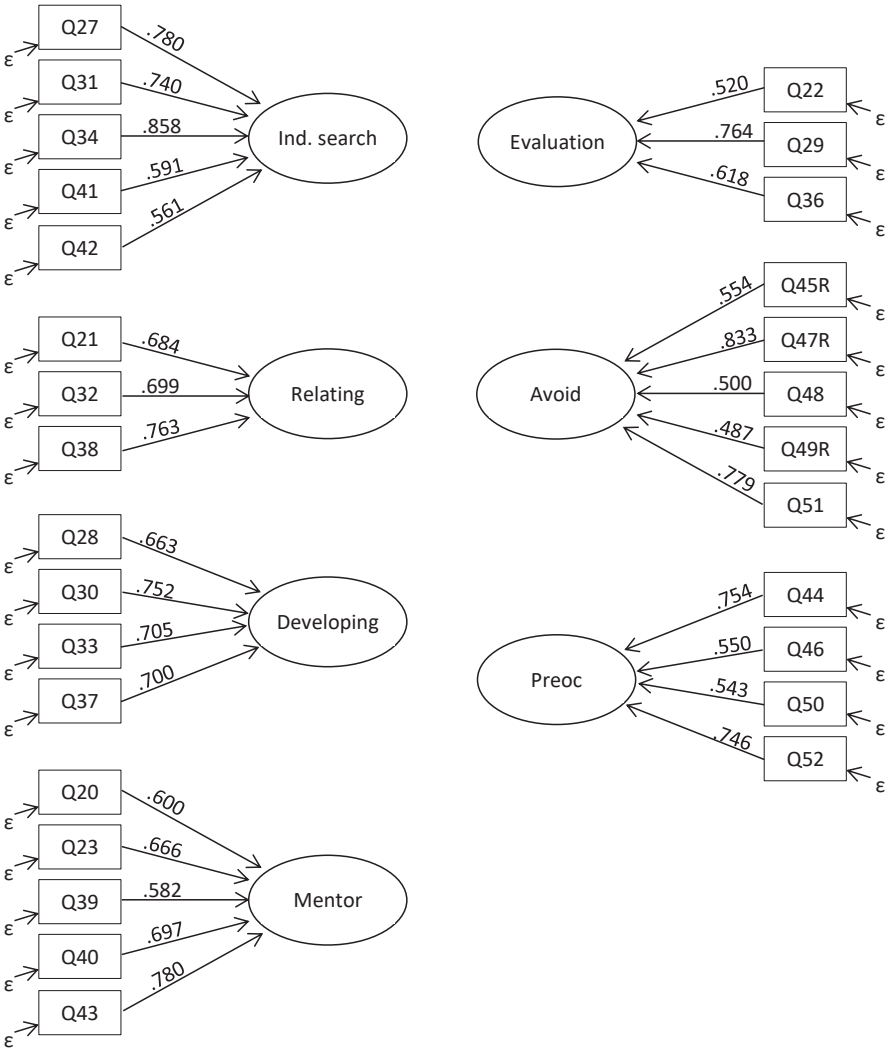

Figure 1. Final model: standardized parameters (n = 355)

All parameters significant at $p \leq .001$; Mentor = proactive, broad use of the mentor; Ind. Search = independent search for conceptual information; Relating = Actively relating theory and practice; Developing = developing ideas/views through discussion; Evaluation = pupil-oriented evaluation criteria; Avoid = avoidance; Preoc = preoccupation

sample 1 by means of a CFA on sample 2. The results of this analysis confirm the factorial structure. The fit indices indicated a good fitting model (RMSEA = .047; SRMR = .054; CFI = .915). Figure 1 visualizes the standardized parameters. The interfactor correlations and internal consistencies can be found in Table 5. As Table 5 shows, the internal consistency of all factors can be considered as good (α = .74 - .83), except for the three-item factor 'pupil-oriented evaluation criteria that has an acceptable reliability (α = .66).

As expected, most factors turned out to be related. Student teachers that indicated to search more independently for conceptual information, report that they develop more ideas/views through discussion (r = .462, $p \leq$ .001) and relate theory and practice more strongly (r = .537, $p \leq$ .001). Relating theory

Table 5
Final model of the ILTP-R: interfactor correlations (n = 355)

	Mentor	Ind. search	Relating	Deveoping	Evaluation	Avoid	Preoc
Mentor	1						
Ind. search	.231***	1					
Relating	.324***	.537***	1				
Developing	.344***	.462***	.436***	1			
Evaluation	.452***	.175**	.162*	.185**	1		
Avoid	-.592***	-.128*	-.307***	-.199**	-.372***	1	
Preoc	.219***	.091	.147*	-.082	.330***	-.359***	1
Items	5	5	3	4	3	5	4
α	.80	.83	.76	.80	.66	.77	.74

*$p \leq .05$, **$p \leq .01$, ***$p \leq .001$
Ind. Search = independent search for conceptual information; Relating = Actively relating theory and practice; Developing = developing ideas/views through discussion; Mentor = proactive, broad use of the mentor; Evaluation = pupil-oriented evaluation criteria; Avoid = avoidance; Preoc = preoccupation; α = Cronbach's α

and practice also positively relates to developing ideas/views through discussion ($r = .275$, $p \leq .001$). Furthermore, student teachers that indicated that they make more use of their mentor, more often indicate to develop their ideas/view through discussion ($r = .344$, $p \leq .001$). These students also tend to use more pupil-oriented evaluation criteria ($r = .452$, $p \leq .001$). Finally, avoidance seems detrimental for the learning to teach process. Student teachers reporting to avoid analyzing bad lessons, also state that they use less pupil-oriented criteria to evaluate their lessons ($r = -.372$, $p \leq .001$), make less proactive, broad use of their mentor ($r = -.592$, $p \leq .001$), and relate less actively theory and practice ($r = .307$, $p \leq .001$).

6 Conclusion and Discussion

Although the ILTP questionnaire is often used in teacher education programs to tap student teachers' way of learning-to-teach, a formal and thorough investigation of the factorial structure, using state-of-the-art analysis techniques was presently lacking. Based on the original sample and new samples collected in different teacher education programs, we have tested the construct validity and internal consistency of the ILTP and an update of the original learning to teach process framework (Oosterheert, 2001). A CFA on the original data set did not support the hypothesized structure of the questionnaire. The factors measuring the dimension 'learning conception' could not be retained in any form. Therefore, we decided to develop a shorter version of the instrument that only included the items of the dimensions learning and regulation activities and emotion regulation.

In order to further explore the dimensional structure of the ILTP, a series of EFA's and CFA's were carried out. A resulting 7-factor model was retained, which resembled the original structure of the five learning and regulation activities factors and two emotion regulation factors. Four items were removed for better fit, resulting now in a 29-item revised version of the instrument (ILTP-R). The internal consistency of the seven factors was acceptable to good. Although the latter does not exempt future studies from examining the reliability of the factors, it adds up to the available evidence that underpins the reliability of the ILTP-R in measuring the learning and regulative activities as well as emotion regulation activities (e.g., Donche, Endedijk, & van Daal, 2015; Endedijk, Vermunt, Meijer, & Brekelmans, 2014).

Even though the theoretical foundation and the foundational qualitative studies were strong, problems reoccurred with the factors

'*Practising and testing*', '*Raising consciousness under external control*', and '*Strong self-determination in performance improvement*' that represent the learning conception component. One of the causes could be, that these factors were multi-dimensional: as the names of the factors already show, both the conception of regulation of learning (self-determined learning versus learning under external control) and the aim of learning (raising consciousness versus performance improvement), were included in the same factor. Both dimensions can be recognized from literature as relevant (Vermunt & Endedijk, 2011), but combining both dimensions in the same factors might have caused psychometric problems. As the original learning conception scales also contained a different number of items, ranging from 3 to 9 items, this could not be solved by further reduction of the items. This means that the ILTP-R only covers three out of the four components of the learning pattern framework (Vermunt & Donche, 2017). Although there is a sound theoretical and empirical base regarding the interrelationship between student conceptions of learning, learning strategies and performance in higher education contexts (Van Rossum & Hamer, 2010; Vermunt & Donche, 2017; Vermunt & Endedijk, 2011), it is not unusual to study individual differences in students' learning with a smaller set of components. For example, the original two-dimensional student approaches to learning framework only includes cognitive strategies and motivational components (Lonka et al., 2004; Vanthournout, Donche, Gijbels, & van Petegem, 2013). Learning conceptions were included in later models, but also arguments have been made to see learning conceptions as a separate influencing factor on how students learn, next to their perception of the academic environment (Richardson, 2011). One reason to separate learning conceptions from the other components is that learning conceptions are rather stable (Richardson, 2011) and therefore result also in rather stable learning patterns. A previous longitudinal study that used the original ILTP (Endedijk, Vermunt, et al., 2014) indeed showed differences per factor in how stable these scores were over time, with no changes over time in two out of the three learning conception factors. Nevertheless, the same study showed that student teachers' learning patterns are changeable as within a year 63% of the student teachers changed their learning pattern. To better understand the relevance of the inclusion of learning conceptions in a future version of the instrument, we do recommend to further disentangle the dimensionality of learning conceptions related to student teacher learning. Although research has been carried out on general learning conceptions of teachers (Boulton-Lewis, Wilss, & Mutch, 1996), research on specific conceptions of *learning to teach* is scarce (Endedijk, Brekelmans, Verloop, Sleegers, & Vermunt, 2014). Therefore, additional studies are needed, both in-depth studies to explore the nature of student teachers' learning conceptions and more largescale studies to develop new sets of items and test these. In conclusion, the ILTP-R has without inclusion learning conceptions a narrower focus than the original ILTP. However, the current set of components is well aligned to the more selective student approaches to learning framework (Vanthournout et al., 2013) and resembles the core three components of the learning patterns framework, the ILTP-R can very well be used to identify individual differences in *how* student teachers learn and how this varies over time.

It is clear from the results, that most of the remaining factors of the ILTP-R are interrelated in a meaningful way, providing further evidence of the discriminant validity of the questionnaire. Associations between factors such as '*independently search for conceptual information*', '*developing more ideas/views through discussion*', and '*actively relating theory and practice*' point at the presence of more an independent pattern of learning to teach. On the other hand, the substantial correlations between '*proactive use of the mentor*', '*pupil-oriented evaluation criteria on the other hand*', *and* '*avoidance*' (negative correlation), indicate the presence

of a more dependent pattern of learning to teach. In order to describe individual differences in student teacher learning, the use of more person-oriented analyses, such as latent class analysis might be an interesting next step. If one aims to describe individual differences in student teacher learning in the tradition of learning pattern research (Richardson, 2011), we suggest to extent the ILTP-R with a broader operationalization of the affective component than only the emotion regulation, for example by including student teachers' more general motivation to learn. Different models of student motivation, such as the self-determination theory (Deci & Ryan, 2000) could be inspected for possible inclusion in the student teacher learning model. From a practice-oriented perspective, this would enable a more comprehensive insight in the 'why' and 'how' of student teacher learning during internships as well as provide input for feedback and feed forward.

The ILTP-R is a domain-specific self-report measure of the learning and regulation activities that student teachers typically use. In the last two decades, we have seen an intensive debate among scientists on the added value of self-report instruments to measure latent constructs such as study motivation and strategy use (van Meter, 2020). The 2020 Special Issue of Frontline Learning Research is completely devoted to this question and concludes that "… self-report measures are a unique, valuable – and therefore irreplaceable – source of information about many critical aspects of the learning processes…" (Fryer & Dinsmore, 2020, p. 3). Self-report instruments *can* provide reliable and valid indicators of motivation and strategy use and provide explanatory power (van Meter, 2020). But, as Van Meter argues, the main question to be asked is *when* they do so. The limitations are not necessarily in the self-report measure itself, but more often in the cross-sectional research design or simple analysis techniques that are used (van Meter, 2020). Innovations and improved research designs are critical, which include prevailing longitudinal design over snap-shot data and using multi-method multi-trait designs (Fryer & Dinsmore, 2020). The study of Endedijk and Vermunt (2013) showed for example already meaningful relations between the outcomes of the ILTP and weekly learning and regulation activities as reported via a structured digital log. In the future, combining the ILTP-R with other instruments, such as structured observations might also help to expand the insights in how student teachers learn. In addition, we want to point to a very relevant note from the commentary of Winne (2020), namely that the quality of self-report data (both survey data as other forms such as think-aloud data) is mostly dependent on the level a respondent knows him- or herself. Improving the quality of self-report data can therefore be attained by better understanding the difficulty of this and helping learners in understanding themselves as a learner. The implications of this for teacher education will be discussed below, after we elaborated on some of the study's limitations and future research directions.

6.1 Limitations and future research

Our sample had an adequate size for the purpose of the study, the data sets reflected the different types of teacher education programs and had high response rates. The original sample differed from the other sample in that only 21.5% of the students followed a postgraduate university programs (UP), while in the other data sets (that constitute the second sample) about half of the students (48.6%) followed this type of program. Given the outcomes of a review study on experienced teachers' workplace learning in which no differences were found between primary and secondary school teachers (Kyndt, Gijbels, Grosemans, & Donche, 2016), we do not expect major differences between, student teachers for different types of education, but further research is necessary to confirm this. Also, it should be noted, that the instrument is developed to measure student teachers' process of learning to teach in a dual learning program, irrespective of the type of teacher education program. If differences may occur, we expect these to be related to the exposure to the teaching practice, as the instrument is particularly suitable for student teachers with

a basic amount of teaching experience and not for student teachers without substantial teaching experience, as also the study of Endedijk, Vermunt, et al. (2014) confirmed. As the latter description applies to all students in both samples, this indicates that the difference in composition of both samples might not have played such a major role. Future studies can look into the measurement invariance of the ILRP-R across different groups of student teachers, across countries (to check for differences between Dutch and Belgian samples) and over time. Another next step will be to validate the English version of the instrument (see Appendix) and the German version (Festner et al., 2020; Hascher & Hagenauer, 2016), in order to validate the learning to teach model across countries.

In addition, the concurrent validity could be strengthened when the self-report data of the specific scale scores could be related to objective measurements. For example, the scale *"proactive, broad use of the mentor"* could be related to reports of mentor meeting, and the scale *"developing views/ideas through discussion"* could be compared to social network data of the student teacher. For the emotion regulation scales, one could think of relating this data to measures of stress-levels. Finally, as argued in the beginning of this paper, the purpose of measuring *how* student teachers learn is that an active and meaning-oriented way of learning is expected to be needed in order to become an expert teacher and to enable lifelong learning in the dynamic teaching environment (Bakkenes et al., 2010; Bronkhorst et al., 2011; Endedijk et al., 2012; Hagger et al., 2008; Mutton et al., 2010; Oosterheert, 2001). However, empirical studies into the relationship between student teachers' learning pattern and professional learning outcomes are still lacking. As Fallon (2008, p. 837) has concluded, "the field of teacher education and teacher learning is deep and rich in normative and logical reasoning, but shallow in empirical knowledge". In other words, an important next step will be to set up a longitudinal study to empirically test the relation between how student teachers learn and what they learn, during pre-service teacher education, the induction phase and in their development towards expert teachers.

6.2 Implications for research and practice

In this study, we validated a revised version of the ILTP. The instrument enables practitioners to substantiate their feedback concerning how their student teachers learn with validated and reliable measurements. The ILTP-R can be used for teacher educators to monitor the development of student teachers' learning to teach *process*, but also to use the instrument as a source for student teachers to guide their self-reflection and better learn to know themselves as a learner. Feedback on their dominant learning pattern will assist them in developing more insights in their identity as a learner, which is crucial as teachers have to continue learning also after graduation (Vermunt & Endedijk, 2011). In addition, feedback on their scores on the various processing and regulation scales will help to monitor their development and set goals for the development of their approaches to learning to teach. Depending on the aim of the feedback, different benchmarks can be used: either scores of their peers or their own scores on different moments in time. The current instrument has no feedback guide to assist student teachers or teacher educators in interpreting the outcomes. As Kane (2013) argues that validity is not only a property of the test or instrument, but mainly a property of the interpretation and use, this means that we also advise to develop guidelines on how to interpret the outcomes and subsequently test the effects of the feedback that is given and subsequent actions taken.

The learning patterns are not equally beneficial in becoming a teacher; growing towards more active and meaning oriented learning is necessary (Festner et al., 2020; Oosterheert, 2001; Oosterheert, Vermunt, & Veenstra, 2002). As learning patterns appear to be subject to change (Endedijk, Vermunt, Meijer, & Brekelmans, 2014) it seems important and worth the effort to raise attention in teacher education programs to these differences and to take them into account

and provide adaptive support. In this regard, we propose a three-step approach to teacher education curriculum design (Endedijk, Donche, & Oosterheert, 2014). The steps are 1) align education; 2) provide some time to grow as a learner and 3) help student teachers to meet the expectations. The first step is to set the learning goals clearly (content *and* level) and teach and assess accordingly (e.g. Biggs, 1996). Initial learning patterns of many student teachers will then be challenged, if necessary, without doing anything in particular for specific student teachers. A fully aligned meaning oriented curriculum from the very start may, however, be too selective for some potentially good teachers. Therefore, the second step is to design a curriculum that gives student teachers room to grow as learners. Some individual student teachers may need more than alignment and time; they need additional guidance to develop the required skills and habits as learners (step 3). Principles of scaffolding (e.g., asking questions, modelling, giving hints, (van de Pol, Volman, & Beishuizen, 2010)) can help them to provide adaptive support. Further guidance varies from student to student, given their current predominant way of learning and related challenges (see e.g. Oosterheert, 2001; Endedijk, Donche, & Oosterheert, 2014; Oosterheert, Donche, Endedijk, & van der Wal-Maris, 2017). For some student teachers, certain barriers to learning (Illeris, 2007) may first need to be identified, before they can develop further. Other student teachers might need a more concrete approach, for example, suggestions for experimenting with other learning and regulation activities. Therefore, the teacher educator has also an important role in identifying student teachers' individual needs and choosing the specific strategies to support student teachers with their development towards an active and meaning-oriented learner.

Note

Readers interested in more details regarding the analyses and datasets, are invited to contact the authors for further information.

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Samenvatting

De herziene Inventory Learning to Teach Process: Ontwikkeling van een vragenlijst om te meten hoe docenten in opleiding leren lesgeven

Eén van de kerntaken van de opleiding voor leraar primair en secundair onderwijs is ervoor te zorgen dat docenten de competenties verkrijgen om zich ook na de opleiding te blijven ontwikkelen. Twee decennia geleden is de Inventory Learning to Teach Process (ILTP) ontwikkeld om inzicht te krijgen in het proces van leren lesgeven van docenten in opleiding. Deze zelfrapportage vragenlijst meet met behulp van tien schalen de leer- en regulatieactiviteiten van docenten in opleiding, de emotieregulatie en hun leerconcepties van het leren lesgeven. In dit artikel onderzoeken we de constructvaliditeit van de ILTP met hedendaagse analysetechnieken en ontwikkelen we een verkorte versie van het instrument. De dataset bestaat uit 1094 docenten in opleiding. Exploratieve en confirmatieve factoranalyses zijn gebruikt om de factorstructuur van het instrument te testen. De analyses resulteerden in een kortere versie met 29 items met goede fitmaten en interne consistentie. De leerconceptieschalen konden in geen enkele vorm behouden worden. De kortere versie van de ILTP (ILTP-R) kan in vervolgonderzoek worden gebruikt om de ontwikkeling van docenten in opleiding doorheen de tijd te volgen. Bovendien geeft de ILTP-R aan lerarenopleiders de mogelijkheid om onderbouwde feedback te geven, gebaseerd op betrouwbare en valide metingen over hoe docenten in opleiding op dat moment hun leerproces ter hand nemen.

Kernwoorden: leren lesgeven, lerarenopleiding, docenten-in-opleiding, vragenlijst, validering

Appendix

Overview of the items of the ILTP and ILTP-R in English and Dutch

Item	Dutch items	English items*	Scale	ILTP-R
Q1	Leren lesgeven is voornamelijk een kwestie van uitproberen in de praktijk.	Learning to teach is above all trying out different things in practice.	Practice	
Q2	Opleiders moeten mij vooral praktische suggesties geven.	Teacher educators should focus on giving practical suggestions.	Practice	
Q3	Leren lesgeven zie ik vooral als: uitzoeken welke manier van lesgeven voor mij helpt.	I see learning to teach primarily as finding out which didactic approach works for me.	Practice	
Q4	Problemen in mijn lesgeven kan ik zelf het beste signaleren.	I am the person most capable of signaling problems in my teaching.	Self-determ	
Q5	Wat ik leer hangt af van de problemen die ik tegenkom in mijn lessen.	What I learn depends on the problems I encounter in my lessons.	Practice	
Q6	Ik vind het belangrijk dat de stagebegeleider mij vertelt waarom hij/zij een bepaalde lessituatie op een bepaalde manier interpreteert.	It is important to me for my mentor to tell me why (s)he interprets a specific teaching situation in a certain manner.	Ext. control	
Q7	Ik vind het aangenaam wanneer een opleider of mijn stagebegeleider aangeeft waaraan ik volgens hem/haar nog zou kunnen werken in mijn lesgeven.	I appreciate it when a teacher educator or my mentor suggests which aspects of my teaching I could try to improve.	Ext. control	
Q8	Ik zie het leren lesgeven vooral als het uittesten van praktische ideeën in mijn lesgeven.	I see learning to teach primarily as testing practical ideas in my teaching.	Practice	
Q9	Ik vind het belangrijk dat opleiders en de stagebegeleider mij stimuleren om na te denken over mijn lesgeven.	I think it is important that teacher educators and my mentor stimulate me to think about my teaching.	Ext. control	
Q10	Een ander kan minder goed dan ikzelf nagaan op welke punten ik mijn lesgeven kan verbeteren.	Other people are less capable of seeing what I could change in my teaching than I am myself.	Self-determ	
Q11	Het enige wat ik zelf kan bijdragen aan het leren lesgeven is dat ik zoveel mogelijk lessen geef.	The only thing I can do to learn to teach is to teach as many lessons as possible.	Practice	
Q12	Ik vind het belangrijk dat anderen mij bewust maken van mijn gedrag in de klas.	It is important for me that others make me aware of my behaviour in the classroom.	Ext. control	
Q13	Veel lesgeven is het enige dat mij helpt bij het leren lesgeven.	Teaching a lot is the only thing that helps me to learn to teach	Practice	
Q14	Leren lesgeven houdt voor mij vooral in dat ik praktische suggesties/tips uitprobeer in mijn lessen en kijk of die voor mij werken.	For me, learning to teach means above all trying out practical suggestions in my lessons to see if they work for me	Practice	
Q15	Over lesgeven moet je niet teveel nadenken.	You should not think too much about teaching (R).	Ext. control	
Q16	Ik heb graag dat opleiders mij helpen bij het analyseren van lessituaties die ik niet begrijp.	I appreciate when teacher educators help me in the analysis of teaching situations which I do not understand	Ext. control	

Q17	Om te leren lesgeven heb ik genoeg aan het opdoen van veel leservaring.	A lot of teaching experience is sufficient for me in order to learn how to teach (R).	Ext. control	
Q18	Ik vind dat ik zelf het beste kan bepalen aan welke aspecten van mijn lesgeven ik nog moet werken.	I think that I am the best person to determine which aspects of my teaching still require attention.	Self-determ	
Q19	Van de stagebegeleider wil ik vooral praktische ideeën aangereikt krijgen.	It is from my mentor most of all that I would like to receive practical tips and suggestions	Practice	
Q20	Ik vraag mijn stagebegeleider hoe hij/zij dezelfde lessituatie zou aanpakken.	I ask my mentor how he or she would deal with the same teaching situation	Mentor	X
Q21	Door de theorie die tijdens stagebegeleiding aan de orde komt, kan ik nieuwe leservaringen beter plaatsen.	The theory that is discussed during mentoring activities helps me to interpret my teaching experiences better.	Relating	X
Q22	Mijn tevredenheid over een les wordt met name bepaald door de mate waarin er in die les een goede werksfeer was.	My satisfaction with a lesson is largely determined by the extent to which a good working climate is present in the classroom.	Evaluation	X
Q23	Ik vraag mijn stagebegeleider waarom, volgens hem/haar , iets in mijn les op een bepaalde manier verliep.	I ask my mentor why, according to him/her, certain things in my lesson happened in certain ways.	Mentor	X
Q24	Ik doe actief mee met discussies tussen ervaren leraren over onderwijs.	I actively engage in discussions about education with experienced teachers.	Developing	
Q25	Ik probeer theorie in verband te brengen met mijn leservaringen.	I try to relate theory to my own teaching experiences.	Relating	
Q26	Ik ga na waar mijn stagebegeleider allemaal rekening mee houdt bij het beslissen in een bepaalde lessituatie.	I try to find out what information my mentor takes into account when deciding what to do in a specific teaching situation.	Mentor	
Q27	Ik zoek zelf naar theoretische informatie om meer te weten te komen over lesgeven en wat daarbij komt kijken.	I search for theoretical information by myself to improve my knowledge about teaching and related issues.	Ind. search	X
Q28	In mijn stageschool vraag ik andere leraren hoe zij bepaalde problemen in hun lessen aanpakken.	During my teaching practice, I ask other teachers in my school how they deal with specific problems in their lessons.	Developing	X
Q29	Ik ben vooral tevreden over een les als uit de werkhouding/motivatie van de leerlingen blijkt dat de stof is overgekomen.	I am particularly satisfied with a lesson when pupils' engagement during lessons signals that the subject matter has come across.	Evaluation	X
Q30	Ik benader leraren in mijn stageschool om hen te vragen naar hun opvattingen over bepaalde onderwijsvernieuwingen.	I aproach teachers in my school to ask what they think about certain educational innovations.	Developing	X
Q31	Ik lees meer over lesgeven dan ik voor de opleiding hoef te lezen.	I read more about teaching than the prescribed literature on the program.	Ind. search	X
Q32	De manier waarop ik nu wil lesgeven komt voort uit het steeds verbinden van theoretische kennis aan mijn leservaringen.	The way I want to teach now is the result of constantly connecting theoretical knowledge to my teaching experiences.	Relating	X

Q33	Ik vraag ervaren leraren in mijn school wat zij vinden van mijn mening over lesgeven.	I ask teachers in my school what they think about my opinions on teaching.	Developing	X
Q34	Ik beantwoord mijn vragen over lesgeven door uit mijzelf literatuur te raadplegen.	I try to find answers to my questions about teaching by consulting the literature on my own.	Ind. search	X
Q35	Ik gebruik theoretische kennis om mijn lessen te verbeteren.	I use theoretical knowledge to improve my lessons.	Relating	
Q36	Ik ben vooral tevreden over een les als ik aan de manier waarop leerlingen tijdens de les vraagstukken oplossen zie, dat zij de leerstof goed begrijpen.	I am particularly satisfied with a lesson when I see that the manner in which the pupils solve problems signals understanding.	Evaluation	X
Q37	Door te discussiëren met ervaren leraren in mijn stageschool ontwikkel ik mijn eigen ideeën over onderwijs verder.	Through discussion with experienced teachers, I develop my own ideas about education.	Developing	X
Q38	Ik merk dat ik in mijn lessen veel kan met de theoretische informatie die opleiders aandragen.	I notice that I can make good use of the theoretical information that teacher trainers offer.	Relating	X
Q39	De praktische suggesties die mijn stagebegeleider aandraagt om een bepaald probleem op te lossen, zijn op de een of andere manier zinvol voor mij.	The practical suggestions my mentor offers to solve a certain problem are always useful in some way.	Mentor	X
Q40	Ik vraag mijn stagebegeleider wat hij/zij niet goed vindt aan mijn lessen.	I ask my mentor what he or she does not appreciate about my lessons.	Mentor	X
Q41	Naar aanleiding van activiteiten tijdens stagebegeleiding verdiep ik mij zelf verder in een onderwerp dat daar aan de orde kwam.	Mentoring activities trigger me to further explore the topics that were discussed during these activities.	Ind. search	X
Q42	Mijn leservaringen geven aanleiding zelf informatie te gaan zoeken over een bepaald thema.	My teaching experiences trigger me to search for information about a certain theme.	Ind. search	X
Q43	Ik vraag mijn stagebegeleider naar wat hij/zij denkt dat er in een bepaalde lessituatie aan de hand is.	I ask my mentor what he or she thinks what is going on in a specific teaching situation.	Mentor	X
Q44	Het duurt wel even voor ik een slechte leservaring heb verwerkt.	It takes a while before I have processed a bad teaching experience.	Preoc	X
Q45	Ik ga na wat mijn eigen bijdrage was aan een les die uit de hand liep.	I try to determine my own contribution to a lesson that went wrong (R).	Avoid	X
Q46	Als een les qua orde uit de hand loopt, voel ik mij vooral uit het veld geslagen.	When a lesson gets out of hand in terms of classroom management, I feel taken aback	Preoc	X
Q47	Na een slechte les probeer ik een oplossing te vinden voor de volgende les.	After a lesson that has gone badly, I try to find a solution for the next lesson (R).	Avoid	X
Q48	Over een slecht verlopen les denk ik niet na.	I do not think about a lesson that went wrong.	Avoid	X
Q49	Als een les slecht is verlopen, bereid ik de les daarna extra goed voor.	After a lesson that has gone badly, I prepare the next lesson extra intensively (R).	Avoid	X

Q50	Na een vervelende leservaring heb ik het nodig dat een opleider of mijn stagebegeleider aangeeft, of het in deze fase normaal is zoiets mee te maken.	After a lesson that has gone badly I need a teacher trainer or mentor to indicate whether it is normal at this stage of my training to encounter this.	Preoc	X
Q51	Ik zoek naar de oorzaak van een slecht verlopen les.	I search for the cause of a lesson that went wrong (R).	Avoid	X
Q52	Een slecht verlopen les blijft zeker diezelfde dag nog in mijn hoofd rondmalen.	I am preoccupied with a lesson that has gone badly for at least a day.	Preoc	X

* The items have been translated from Dutch to English by a native speaker and expert in teacher education. The last column indicates with an X which items were retained in the ILTP-R. Practice = Practicing and testing ; Self-determ = Strong self-determination in performance improvement ; ext. control = Raising consciousness under external control; Ind. Search = independent search for conceptual information; Relating = Actively relating theory and practice; Developing = developing ideas/views through discussion; Mentor = proactive, broad use of the mentor; Evaluation = pupil-oriented evaluation criteria; Avoid = avoidance; Preoc = preoccupation