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Effects of data feedback in the teacher training community

Effects of data
feedback

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Abstract

Purpose – The purpose of this paper is to answer the question, what progress student teachers make during one academic year, while being trained in a professional learning community, using objective classroom observation, using lesson preparation templates that match their developmental stage and stage-focused mentor feedback.

Design/methodology/approach – The teaching skills of the student teachers ($n = 101$) were measured at the start and at the end of the academic year. For the measurements, the standardized and psychometrically tested International Comparative Analysis of Learning and Teaching observation instrument is used.

Findings – The student teachers achieved a small growth on the basic teaching skills and a medium growth on two of the three advanced skills for teachers.

Research limitations/implications – Because of the lack of a control group, causal conclusions cannot be made. This research provides knowledge on the actual observed level of teaching skills of student teachers trained in a close collaborating professional learning community.

Originality/value – Little is known about the actual growth of observable teaching skills of student teachers in elementary education. Teacher training colleges and internship schools in the Netherlands are in search of better ways to collaborate more closely in order to improve the quality of teaching of their student teachers. These findings can inspire teacher training communities to improve their own teaching quality and the teaching quality of their student teachers.

Keywords Capacity building, Professional learning community, Collaboration, Coaching, Data feedback, Teacher training, Professional development, Quality of teaching

Paper type Research paper

Introduction and research question

Educating student teachers is a shared responsibility between the teacher training college and the internship school. Although a close collaboration within this teacher training community is considered an important prerequisite for a much-desired improvement of the quality of teaching (Ministry of Education, 2019), the training partners still operate in relative isolation, pursuing their own training objectives and own agenda's, according to their own views on what is good teaching and effective training (Valencia *et al.*, 2009; Tas *et al.*, 2018).

In practice, the collaboration between teacher training college and internship schools is organized in such a way that the observation of lessons is largely left to the elementary school teachers who mentor the student teachers. The main guidance instrument used by all actors in the training community in the process of learning to teach is a so-called lesson preparation template which is largely based on the Dutch model Didactical analysis from the 1970s (Van Gelder *et al.*, 1971). In the prevailing coaching procedure in the Netherlands, this template is used by student teachers for the preparation of their lessons, and by mentors for providing feedback on the student teachers' performance, while college teachers introduce the template to the student teachers at the start of the first internship. In general, teacher training colleges use a single mandatory template during all training years; all user groups (including the student teachers themselves) indicate apparent deficiencies in learning to teach on this lesson preparation template. This mandatory template does insufficiently support the professional development of the



student teachers or the acquisition of effective teaching skills and does not provide mentors with guidelines how to give feedback beneficial for the learning process of student teachers.

The first challenge will be the building of a collective practice (Harris, 2011) in which all training partners cooperate according to a shared vision and collectively owned goals (cf. Fullan, 2006). In this inter-institutionally coupled community (Hargreaves, 2011), the efforts of all actors should be bundled. It should entail the collaboration of the college teachers by, first, collectively determining the goals and setting the tasks, and besides closely link their efforts with those of the internship schools by involving, second, elementary school teachers acting as direct mentors of the student teachers and, third, by supporting internship coordinators at the internship schools who are responsible for the guidance quality of the mentors. A research team, fourth, operating from the teacher training college will support this process (see also Table II).

This study aims to answer the question, what progress student teachers make during one academic year, while being trained in a professional learning community, using objective classroom observation, using lesson preparation templates that match their developmental stage and stage focused mentor feedback.

Theoretical and empirical framework

The building of a professional learning community

For the building of a professional learning community in which college teachers, mentors and internship coordinators work closely together in order to increase the teaching quality of their student teachers, five research domains are relevant. Research on “Capacity building and professional learning communities” (1) is studied to create professional learning in which the learning environments of the teacher training college and the internship schools are fully aligned and all actors involved learn from the knowledge and experience available throughout the community. Research on effective teacher behavior (2) is used to empower the teacher training community, by providing a mutually supported framework on what constitutes good teaching. The empirical backgrounds of the observation instrument International Comparative Analysis of Learning and Teaching (ICALT) (3) follows as research domain for the observation of student teachers’ teaching skills, and data-driven feedback (4) as a further research domain for aligning both learning environments. Finally, research on effective feedback (5) is used in order to provide mentors with feedback guidelines.

The research domains (2–5) are also applied to the design of the lesson preparation and feedback templates (in short “lesson templates”) serving as main guidance tools within the professional learning community.

Capacity building through a professional learning community

Capacity building, a concept referring to any effort made to improve the ability, skills and expertise of educators (Stoll, 2009), involves the learning process of individuals or, as a collective practice that of larger school systems improving the practice of others as well as their own (Levin and Fullan, 2008). Its main goal is to increase the collective effectiveness of a community effort to monitor and improve the learning gains of pupils (Levin and Fullan, 2008).

In his discussion of capital building, Hargreaves (2011) distinguishes three subsidiary forms of capital; intellectual capital (human capital, i.e. knowledge skills, competence and expertise levels of staff and students), social capital (trust among members and its reciprocity) and organizational capital (leaders being able to fully deploy the intellectual and social capital in their schools). In the last decade, new partnerships between schools aimed at

capital building have been developed, defined as “coupling.” Organizations can be loosely coupled (i.e. autonomous sub-units, poorly monitored) or more tightly coupled (inter-dependent or integrated sub-units with their own, closely monitored, standardized operating procedures). Furthermore, the couples can be clustered homogeneously (of the same phase of type), or heterogeneously (mixed phases or types). Inter-institutional coupling is constituted by closely linked units in partnership (Hargreaves, 2011).

For capacity building, the development of a professional learning community seems to be the key for a sustainable improvement of teaching quality and learning gain (Stoll *et al.*, 2006).

Professional learning communities are defined by their unique situation (Van Keulen *et al.*, 2015) and are studied from multiple theoretical angles. Therefore one universal definition is not available (Lomos *et al.*, 2011; Stoll *et al.*, 2006). Stoll and Louis (2007) indicate that it is generally agreed that “effective professional learning communities have the capacity to promote and sustain professional learning of educators to enhance pupils’ learning” (p. 2). The concept implies collaborative efforts, shared commitment and educators’ actions being guided by shared norms (Bryk *et al.*, 1999).

In a literature review, Stoll *et al.* (2006) indicate that effective professional learning communities are generally characterized by the following five intertwined and interacting features:

- (1) Shared values and vision (or a shared sense of purpose) are considered a key feature, emphasizing the constant focus on the learning of all pupils (Hord, 2004). These shared values provide the framework for joint and ethical decision making (Louis *et al.*, 1995).
- (2) Collective responsibilities for the learning process of pupils (to be taken by all).
- (3) Reflective professional inquiry, including:
 - Reflective dialogue, an essential aspect of professional collaboration, referring to a mutual reflection process in which educational partners engage to discuss meaningful issues for improving the quality of their work. This may concern improving the curriculum, the instruction quality, the application of new knowledge, the progress of pupils or pressing problems in the classroom (Louis *et al.*, 1995).
 - De-privatization of practice (or “shared autonomy”), indicating the shared analysis of the quality of education, provided by classroom observation and feedback by peers, the discussion of cases and the planning of the curriculum and the mutual practice that educators visit classes taught by their peer colleges and give each other feedback.
- (4) Collaboration, indicating that educators work together in several ways, which go beyond superficial assistance, but includes joint review and feedback (Hord, 2004).
- (5) Group learning as well as individual learning is promoted. As Louis *et al.* (1995) put it, “all teachers are learners with their colleagues.”

Based on their own research, Stoll *et al.* (2006) confirm these five characteristics. They add three more features, being:

- (6) mutual trust, respect and support among staff members;
- (7) inclusive membership; the community extending beyond teachers and school leaders to support staff; and
- (8) openness, networks and partnerships.

Lomos *et al.* (2011) have used the five described variables of effective professional learning communities in a meta-analysis and found small and significant effect sizes ($d = 0.25$, $p < 0.05$) of pupils’ achievement.

In teacher training a professional learning community, and support of the learning processes, can be inspired, initiated and facilitated by a team leader (Zaccaro *et al.*, 2008) or by a research team, coordinating the learning process and providing new knowledge and insights and thus functioning as a role model (Bolhuis *et al.*, 2016).

The contours of the professional learning community being built

There does not exist any “ready-made” professional learning community fitting our attempt to improve the teaching quality of student teachers. The organizational form of the professional learning community to be built has to bridge two learning environments (of the college and the schools). Therefore, a heterogeneous, inter-institutional, preferably tightly coupled community is required.

Several meetings were called headed by the research team investigating the needs of all actors (including the student teachers). These led to the installment of four inter-institutional teams, three of which operated during the design stage (involved in designing and organizing the professional learning community) and one research team managing the processes in the design stage and during the implementation stage (coordinating the communication between all actors of the learning community, including the student teachers).

In the next paragraph of the theoretical framework, effective teacher behavior is presented as a mutual framework in the professional learning community on what is considered good teaching, thus linking both study environments.

Effective teacher behavior

A strong alignment of what is taught and what is practiced in the professional learning community is required. Therefore, the community is empowered with the use of recent research on effective teacher behavior.

A long tradition of research on effective teacher behavior provides a body of evidence on the ways in which teaching skills contribute to pupils’ learning gains (Creemers, 1994; Ellis and Worthington, 1994; Hattie, 2008; Ko and Sammons, 2013; Sammons *et al.*, 1995; Scheerens, 2015; Scheerens and Bosker, 1997; Walberg and Haertel, 1992).

For the new lesson templates, observational teacher behavior that teachers show in their everyday lessons is of interest. The following six categories of observational effective teaching skills can be distinguished: creating a safe and stimulating learning climate, efficient classroom management skills, giving clear instruction, activating pupils, adaptive teaching and teaching learning strategies (Van de Grift, 2007; Van de Grift *et al.*, 2011).

These six categories are as follows included in the lesson templates.

Incorporating the category “Creating a safe and stimulating learning climate” (1), means that the template should give student teachers adequate guidance and support in how to draw up clear rules and classroom regulations (Gottfredson *et al.*, 2005) and support to maintain behavioral rules and living up to them (Davis, 2003). Within the stage-focused template, this category also includes providing help and support in how to motivate the pupils (Fuchs *et al.*, 2002).

Effective teachers organize their lessons in such a way that time loss is limited to a minimum (Karweit, 1989; Scheerens and Bosker, 1997). To support “Efficient classroom management” (2), the template offers student teachers guidance in matters of time management, so that they can optimize the “time-on-task” for their pupils (Mastropieri and Scruggs, 2001; Yair, 2000). To do so, “time table boxes” are created on the lesson templates for student teachers to fill out in advance. Self-help questions were added for student teachers to think through essential procedures and to organize and distribute didactical materials in advance.

The prevailing coaching with lesson templates in the Netherlands does not support student teachers in preparing for a clear and structured instruction. However, research

shows that effective teachers structure their instruction in such a way that former acquired knowledge is combined with new knowledge (Creemers, 1994; Muijs and Reynolds, 2010) and that lesson objectives for the pupils are well communicated in advance (Smith *et al.*, 2008). During instruction, teachers have to make sure that all pupils understand the subject taught and guide pupils further; in applying what is learned (Kameenui and Carnine, 1998; Lohman, 1986; Nunes and Bryant, 1996; Pearson and Fielding, 1991; Rosenshine and Meister, 1997).

Our lesson templates therefore support student teachers toward “Giving clear and structured instruction” (3). Self-help questions provide support for the student teacher to set clear goals for their pupils and to communicate them at the start of the instruction. The different lesson phases of the direct instruction are pre-printed on the templates beforehand, whereby they can function as a scaffold for the student teacher.

In research from the 1960s onwards, a positive correlation between the involvement of pupils and their learning outcomes has been established (Fredricks *et al.*, 2004). Teachers can for instance increase the involvement of their pupils by posing higher order questions (Craig *et al.*, 2006; Mantione and Smead, 2003; Murphy *et al.*, 2009); by giving clear guidance (Harn *et al.*, 2008); by avoiding excessive seatwork (Hampton and Reiser, 2004; Lang and Kersting, 2007); and by the use of activating cooperative work forms (Meeuwisse *et al.*, 2010; Slavin, 2010). In the lesson, preparation templates such “Activating teaching skills” (4) are supported by adequately and concretely preparing the “higher order” questions student teachers should plan to ask during instruction and by anticipating the answers they expect or hope to receive. In addition, the templates encourage student teachers to intersperse their lessons structured around activating cooperative work with carefully placed breaks.

In order to meet the needs of all pupils in the classroom, teachers have to adapt their instruction and assignments to accommodate all learners (Houtveen and Van de Grift, 2012). Placing and regularly rearranging pupils in appropriate (adequately functioning) ability groups leads to better learning results (Block and Mangieri, 2009; Houtveen *et al.*, 1999; Slavin, 1987; Walmsley and Allington, 2007). In addition, teachers have to find appropriate ways to extend their instruction time, for example, through pre- and re-teaching (Bosker, 2005; Houtveen *et al.*, 1999; Kidron and Lindsay, 2014).

This “Adaptive teaching” (5) is considered to be one of the most difficult teaching skills to master for student teachers, learning to differentiate their instruction toward the different learning needs of their pupils (Van Geel *et al.*, 2019). The lesson templates support student teachers in their learning process by helping them to place their pupils in the appropriate ability groups and adapt their instruction and assignments to the differences in learning needs of their pupils. In addition, structuring the lesson on the templates supports the student teachers in gaining as much learning time as possible through the advance organization of pre- and re-teaching, while staying on track and keeping an effective oversight of the overall learning process of their class.

Finally, the category of “Teaching learning strategies” (6) means that a pre-structured lesson template provides student teachers with guidance and help in their preparation of the teaching of learning strategies to their pupils. For example, the templates include the following kinds of strategies and questions: “modeling,” “scaffolding” and “providing effective feedback” (Dixon *et al.*, 1998; Brophy and Good, 1986; Hattie and Clinton, 2008; Houtveen and Van de Grift, 2007; Rosenshine and Stevens, 1986; Smith *et al.*, 2008). On the template, the self-help question asked is: “what does the student teacher show or do?” and “student teacher, please anticipate the kind of feedback you would welcome or may be necessary in this stage of developing your teaching skills. To provide guidance with the strategy “thinking aloud” (Block and Israel, 2004; Duffy, 2003; Israel and Massey, 2005; Pressley, 2002), the self-help question is: “student teacher, please formulate your thoughts aloud,” “now I will perform,” etc.

This section gives an overview of the extensive research tradition into effective teaching skills (the above-mentioned categories) with their references. Research into the first categories, started decades ago, now seems more or less finalized. In contrast the more advanced skills, as shown, are still object of research. For an overview of the teaching categories: (Van den Hurk *et al.*, 2018).

Observation instrument

The effective teacher behavior is included in the psychometrically tested observation instrument “International Comparative Analysis of Learning and Teaching” (ICALT). It meets important criteria of reliability, validity and standardization (Van de Grift, 1994, 2007; Van de Grift *et al.*, 2011) and is suitable for training purposes. The instrument includes 32 high inferential and 120 low inferential items that specify observable teaching behaviors, grouped in six domains: “Creating a safe and stimulating learning climate,” “Efficient classroom management,” “Giving clear and structured instruction,” “Activating pupils,” “Adaptive teaching” and “Teaching learning strategies.” The items are evaluated on a four-point scale: predominantly weak (1), more weaknesses than strengths (2), more strengths than weaknesses (3) and predominantly strong (4). At first, these items were used in the Dutch inspection system to observe teachers in elementary education in the Netherlands (Van de Grift, 1985; Van de Grift and Lam, 1998). Since then the items were refined and fed into the ICALT observation instrument.

The observation instrument is being used in the training community to serve several goals: the instrument enables mentors to objectively observe effective teaching skills in practice and helps them to provide student teachers with effective feedback. It also enables impartial observers to diagnose the accurate professional development stage of the individual student teacher. Furthermore, it enables the observers to assign the appropriate lesson templates to give support to the student teachers’ development. The observation instrument is used in two training programs in order to create a mutual educational language and discussions can be held on what is considered “good teaching.” The ultimate goal will be to achieve mutual consensus in the observation of student teachers in practice.

Data-driven feedback

To facilitate the collaboration between all actors in the professional learning community based on objective observation, we have studied the data-driven feedback model (Houtveen, 2018).

This model serves three purposes: it provides insight in the level of teaching skills of (student) teachers, it guides the development of teaching skills of (student) teachers and the model links the knowledge offered at the teacher training college with the training provided at the internship schools. To establish this link, an observation instrument is used in which the knowledge base on effective teacher behavior is operationalized in observable teaching skills. All observers, trained in the correct use of this observation instrument, are observing student teachers according to this common frame of reference. The observers enter their scores into a digital system, which makes the progress of the student teacher’s teaching skills immediately visual for the supervisor in the internship school, the college teacher and the student teacher. The results are used for the provision of feedback. The feedback is, in other words, data-driven. Student teachers can actively process the results from the classroom observations obtained with a standardized observation instrument, into reasoned development plans. On the basis of the observation scores, student teachers describe which teaching skills are to be practiced during internship in order to achieve a higher level in teaching. Furthermore, they connect the observation data with theory on effective teacher behavior provided at the teacher training college (Houtveen, 2018).

Data use already turned out to be a promising in school improvement and in a professional learning community in teacher training in the Netherlands (Bolhuis *et al.*, 2016, 2017; Schildkamp, 2019; Schildkamp *et al.*, 2012).

The effectiveness of the data-driven feedback model in teacher training has been shown in several studies. Student teachers, coached with the data-driven feedback model, showed a significant growth in student teachers' interactive reading skills within five weeks (Neven-Hummel *et al.*, 2014; Van den Hurk *et al.*, 2014). Certified teachers, trained with the data-driven feedback model, achieved small effects sizes measured with the ICALT observation instrument (Van den Hurk *et al.*, 2016, 2018).

The data-driven feedback model will be used by the professional learning community. Two observation and data-driven feedback cycles are to be carried out; one is at the start of the student teacher's internship to be performed by an impartial internship coordinator and a second one by the direct mentor of the student teacher during the internship period. Further processing of the results from classroom observations into development plans by student teachers will not be carried out.

The collected data will be used to monitor the progress of student teachers and to advise the management board of the teacher training community on possible improvements to be made in the collective teacher training program.

Effective feedback

Mentors indicate that in the guidance process clear guidelines for giving effective feedback to student teachers during internship are missing. Therefore, the applicability of research on feedback has been studied. According to Hattie and Timperley (2007), feedback is best applied in a cycle of "feed up," "feedback" and "feedforward." Feed up refers to desired objectives (where am I going?); feedback to the progress made (how am I doing?) and feedforward to the activities that will lead to better progress (what next?). Furthermore feedback is most effective at a task level (corrective feedback, ES 1.10) and therefore preferable to feedback on the whole process (praise of the teacher, ES 0.14) (Hattie and Timperley, 2007).

In the new lesson templates, a feedback section for mentors will be added to facilitate the three successive feedback steps (feed up, feedback and feedforward), aimed at providing student teachers with more effective feedback.

The further design process of the professional learning community and the lesson templates is described in the section Teams at work.

Method

This study aims to answer the question, what progress student teachers make during one academic year, while being trained in a professional learning community, using objective classroom observation, using lesson preparation templates that match their developmental stage and stage focused mentor feedback.

The teaching skills of the student teachers from a teacher training college in the Netherlands were measured at the start and at the end of their internship. The ICALT observation instrument was used to measure the growth of the teaching skills during one academic year.

Observers

For the objective observation of student teachers' teaching skills at the start and the end of the internship, a group of impartial internship coordinators was trained in the correct and reliable use of the ICALT observation instrument. In the ICALT training, the focus was on reaching scoring consensus, by objectively observing the students' teaching behavior and

by preventing observers to score the items subjectively, led by personal views. The observers' scores should agree if they observed the same lesson. For that purpose, two lessons of student teachers in their third and fourth year of training were recorded. The first video was used for training purposes; the second video was used to test the inter-rater agreement. The aim was reaching a consensus of 80 percent, which goes along with a Cohen's κ of 0.60.

Scoring the first training video, a 79 percent agreement was reached on all scales on the question of whether a teaching skill was sufficient or insufficient. This percentage of agreement was corrected for the probability of the correct answer with Cohen's κ . An agreement of 79 percent corresponds with 0.58 Cohen's κ and indicates "moderate agreement."

Scoring the second training video, the percentage of agreement increased to 83 percent. This corresponds with 0.66 Cohen (1960) κ and indicates "substantial agreement" (see also the section "training").

Participants

The sample ($n = 101$) consists of predominantly female student teachers of 18–22 years old with an upper higher or university preparatory prior education. In total, 33.7 percent of the student teachers is in the propaedeutic phase of teacher training and 68.3 percent in the main phase. Overall, the sample resembles the population of student teachers at teacher training colleges in the Netherlands, with two exceptions. The percentage of female teachers is higher in this sample (90.1 percent) compared to 74.1 percent in the total population (Ministry of Education, 2018). In addition, teacher training colleges in the Netherlands offer three kinds of training programs: a full-time day program and a part-time program (for study–work combination) and a combined program with an additional bachelor at the university. In this sample considerably more student teachers are included that combine the teacher training college with an additional bachelor program at the university (36.6 percent), and there are less student teachers attending the full-time day program (48.5 percent) compared to the average (second column in Table I).

Teams at work

As already described three inter-institutional teams consisting of actors from the different user groups were involved in designing the lesson templates and the procedure and training programs needed for the implementation in the community. A team of experts from all user

	Sample $n = 101$ %	Population $n = \pm 4.500$ %
<i>Personal characteristics</i>		
Female	90.1	74.4
Ethnic minority	0.5	0.9
<i>Previous education</i>		
Higher education	6.0	2.0
Upper secondary and university preparatory education	76.1	72.0
Secondary vocational education	17.9	26.0
	100.0	100.0
<i>Educational program</i>		
Full-time program with additional bachelor at the university	35.6	5.0
Full-time program	48.5	80.1
Part-time program	15.9	14.9
	100.0	100.0

Table I.
Comparison between
sample and population

groups advised on the quality and the workability of the lesson templates and the coaching procedure as a whole.

Design of the lesson preparation and feedback templates

In total four lesson preparation and feedback templates were designed, building-up in teaching complexity. Each template is divided in three sections: the observation section, the evaluation section and the lesson preparation section. To provide a build-up in complexity in the templates, the ICALT scales were placed in the observation section, functioning as clear and transparent lesson goals for the student teachers to reach and for mentors to base their feedback upon. Templates 1 and 2 include the basic scales. In Template 1 creating a “Safe and stimulating learning climate” is central and in Template 2 “Efficient classroom management” and “Giving a clear instruction.” Template 3 includes the more complex scales “Activating pupils” and “Adaptive teaching” and Template 4 “Teaching learning strategies.”

The second section consists of the evaluation of the lesson taught, based on the lesson observation by the mentor, following the three steps of the feedback model (Hattie and Timperley, 2007). In this section, the mentor scores the selected ICALT skills, provides feedback on the performance and suggests steps to be made in further lessons (cf. Table AI).

The third section of the lesson template is the actual lesson preparation student teachers write in advance of the lesson. Student teachers start by filling out the traditional elements of the Dutch model Didactical Analysis (Van Gelder *et al.*, 1971), by formulating the lesson goals for their pupils, based on their entry level and by choosing the evaluation method. Furthermore, this section supports student teachers in the preparation and application of a direct instruction by following the pre-printed lesson phases on the template. The elements in this section also build up in complexity from the first template, supporting aspects of direct instruction, toward the last supporting aspects of adaptive teaching (cf. Table AII).

Design of the procedures

A second team (consisting of researchers, college teachers, internship coordinators and mentors) managed the organizational impact on the professional learning community. This team created a digital learning environment, available for all actors involved, and designed the training programs that were required.

In the design stage of the training program, discussions were held on what the community considered to be “good teaching.” To establish a mutual framework for normative scoring as training programs, two videos of student teachers lessons were recorded. Experts (internship coordinators, college teachers and researchers familiar with ICALT training) observed the lessons with the ICALT observation instrument. Extensive discussions led to a consensus on scoring the training videos, and implicitly to norms of what were to be considered sufficient or insufficient skills when observing student teachers’ lessons.

Consulting experts

A panel consisting of experts from all users groups, including student teachers, was consulted about the quality and workability of the new templates and the procedures through questionnaires and discussions. Overall, the questionnaires showed that the experts were positive about the gradual increase in complexity (starting from lesson Templates 1–4), and about the addition of an observation and feedback section.

Several team discussions were held on the appropriate use of the lesson template sections: observation, feedback and lesson preparation. Mentors, for instance, discussed the necessity to observe all student teachers’ lessons during internship or some. Agreement was reached on observing at least one lesson a day. College teachers also questioned the

desirability of the use of the model Direct Instruction. This discussion settled on one evaluation a day by the mentor and student teachers evaluating the remaining lessons themselves on the basis of the evaluation criteria of the template.

The exact number of templates to be filled out during internship by student teachers was the next topic. College teachers and mentors thought it best not to indicate an exact number, leaving the student teachers unsure of what number would be satisfactory. The researchers proposed to set the number of templates to be filled out during the propaedeutic phase at a 30 and for the main phase at 40 per semester (roughly corresponding with the amount of internship days). When student teachers protested that this proposition was too high, the Educational Commission, responsible for the quality of the college curriculum, advised to reduce the numbers to a minimum of 20 and 30, respectively, which turned out acceptable for all involved.

Finally, the use of the direct instruction model in the new templates was reason for worries at the college teachers' end. They wondered whether this instruction model would be suitable for all lesson subjects, while the internship coordinators and mentors advocated the use of this model because of its usefulness in class. In the test-period, the instruction model turned out to be suitable for all subjects and age groups and workable for all actors involved.

The professional learning community in full operation

In the professional learning community, the internship coordinator, student teacher's direct mentor and the college teacher cooperate in guiding student teachers learning to teach. This guiding process is supported by a research team operating from the teacher training college. This section starts with a description of the professional learning community in operation with all actors interacting and ends with a description of the supporting activities of the research team.

According to the data-driven feedback model (Houtveen, 2018), at the start of the internship period, an objective internship coordinator observes one of the student teacher's first language or mathematic lessons using the ICALT observation instrument. The internship coordinator discusses the ICALT scores with the student teacher and the direct mentor and enters the scores into the digital system, accessible for all involved. On the basis of these scores, a lesson preparation and feedback template is assigned to the student teacher corresponding to the first scale on which the student teacher scored insufficiently on one (or more) of the ICALT items. For example, a student teacher scoring sufficiently on ICALT items on the scales "Safe learning climate," and "Classroom management," but insufficiently on the scale "Clear instruction," is assigned the lesson template, which supports aspects of "Clear instruction."

The direct mentor further guides the learning process of the student teacher in practice according Hattie and Timperley's (2007) feedback model. Advised by the mentor, the student teacher marks three ICALT items on the lesson template. They function as learning objectives, i.e. teaching skills to be practiced. On the basis of these objectives, the student teacher prepares a specific lesson. The mentor observes this lesson and scores the selected teaching skills. After the lesson, the mentor indicates how the performance of these skills went and suggests further steps in practicing the selected teaching skills (cf. Table AI). Based on this feedback, the student teacher prepares for the next lesson (cf. Table AII).

During this process, the college teacher supports the student teacher, by monitoring the correct way to fill out the lesson template assigned and by providing the underlying theory, at the teacher training college. At the end of the internship period, the college teacher also checks the internship portfolio on the quality and quantity of all templates used, as part of the internship assessment.

During the implementation of all activities in the professional learning community, the research team is responsible for the communication between all user groups, and provides all actors (including the student teachers) with the digital infrastructure (i.e. sending mail and announcements, scheduling training, implementing logbooks, designing PowerPoints and assessment forms).

This research team is also responsible for the monitoring of all student teachers progress to inform the curriculum commission of the teacher training college in order to further improve the teacher training program (Table II).

Training

In order to reach an effective cooperation within the professional learning community, three training programs were established, namely, for: the internship coordinators, the mentors and the college teachers.

Internship coordinators were trained in diagnosing the developmental stage of student teachers and in assigning the matching lesson preparation template. During their training, the main focus was to have them reach scoring consensus by objectively observing the student's teaching behavior, and by refraining from scoring items subjectively led by personal views. Furthermore, mutual agreement was reached on the assignment of the appropriate lesson template based on these observation scores.

Next, mentors were trained in providing effective feedback to their student teachers. During this training, they were instructed how to complete the section "feedback" on the new lesson templates adequately, based on the feedback model of Hattie and Timperley (2007).

College teachers were trained in teaching the underlying theory of the new lesson templates to student teachers and in instructing them the appropriate use of the templates.

Actors	Working at	Function	Responsibility in the professional learning community
Internship coordinator	Elementary school	Responsible for the training (and teaching) quality at the internship school. Guides mentors at the internship school. Contact person with teacher training college	Observes the student teacher with the ICALT observation instrument and assigns the lesson preparation template that matches the developmental stage of the student teacher Trains the mentors in providing student teachers with effective feedback Functions as the impartial observer at the start and the end of the internship
Mentor	Elementary school	Elementary school teacher Direct mentoring of student teachers during internship	Observes lessons at the internship schools. Provides student teachers with effective feedback
College teacher	Teacher training college	Teaches theory at the teacher training college	Sets the course of the professional learning community. Provides the underlying theory of the lesson template at the teacher training college. Checks the lesson preparation templates filled out by the student teachers
Researcher	Teacher training college	Responsible for the communication between all user groups and takes care of the data collection	Handles the digital data infrastructure. Organizes training programs. Trainer of consensus training in observing student teachers' teaching

Table II. Actors involved in the training community, their functions and their responsibilities

Data analysis

The ICALT observation instrument was used to measure student teachers' teaching skills at the start and at the end of the internship. The reliability (Cronbach's α) and the validity (correlation with pupil engagement) of the ICALT scales were tested with the ICALT scores of the pre-test and the post-test ($n = 101$) (Table III).

The reliability was high on all ICALT scales ($\alpha > 0.70$). We tested the validity of the ICALT scales by calculating the correlation between the ICALT scales and the measure of involvement of the pupils taught during the observation. The validity of the scales of the more complex scales (adaptive teaching and teaching learning strategies) was medium (> 0.30), and large at the scales: creating a safe and stimulating learning climate, efficient classroom management, giving a clear instruction and activating pupils (> 0.50).

The significance of the growth between the ICALT averages on the pre-tests and the post-test is computed using a paired *t*-test. The significance of the growth depends on the sample size. Therefore, the effect sizes of the differences in growth were computed with Cohen's (1988) δ . According to Lipsey (1990), effect sizes up to 0.14 can be seen as having had a negligible effect, 0.15 up to 0.44 as a small effect, effect sizes between 0.45 and 0.89 as medium effect, and 0.90 and above as having had a large effect.

Results*Implementation*

To establish the degree of implementation of the coaching steps the following data sources were used: the incoming results in the digital system, internship portfolios and internship assessment forms. The step "Observations and assignment" was 100 percent carried out, which was verified from the incoming results in this digital system. The actual use of the lesson preparation and feedback templates was mandatory at the teacher training college. Student teachers could only pass the internship assessment when meeting the required amount of templates put in practice with mentor feedback (as agreed the amount was set on 20 for the propaedeutic phase and 30 for the main phase). College teachers checked the lesson templates and mentor feedback in the internship portfolios. The internship assessment forms, filled out by the college teachers, showed that all student teachers used the lesson preparation templates and received mentor feedback.

Growth of teaching skills

Table IV shows the ICALT averages of the scores of the teaching skills on all six ICALT scales. Student teachers in this sample scored higher on the pre- and post-tests of the first three ICALT scales (The basic skills: safe climate, classroom management and clear instruction), compared to the more complicated teaching skills (activating pupils,

Table III.
Reliability of the ICALT scales and validity (correlation with pupil engagement) on the pre-test and post-test ($n = 101$)

ICALT scales $n = 101$	Cronbach's α		Correlation with student engagement	
	Pre-test	Post-test	Pre-test	Post-test
Creating a safe and stimulating learning climate	0.80	0.85	0.56	0.55
Efficient classroom management	0.82	0.74	0.69	0.60
Giving a clear instruction	0.89	0.89	0.66	0.66
Activating pupils	0.84	0.83	0.50	0.51
Adaptive teaching	0.84	0.87	0.43	0.34
Teaching learning strategies	0.89	0.91	0.45	0.38
Pupil engagement	0.87	0.90		

adaptive teaching and teaching learning strategies). On these scales, the standard deviation (SD) is higher as well, which points at a larger variance in the scores of the teaching skills. This is understandable, since these scales encompass rather complex teaching skills.

To establish the growth of teaching skills, we compared the ICALT averages between the pre- and post-test on all six ICALT scales. This growth is significant on all ICALT scales ($p < 0.05$). The growth on the scales “Activating pupils” and “Teaching learning strategies” is the largest. In the first four ICALT scales, the SD of the post-tests decreased compared to the SD in the pre-tests. In the two last teaching scales, however, the variance of scores on the post-test increased (SD’s of 0.91 and 0.89), possibly because of the more complex nature of these teaching skills.

The effect sizes of the growth of the teaching skills measured (Cohen, 1988) are small (> 0.19 and < 0.50) on the scales “Creating a safe learning climate” (0.33), “Efficient classroom management” (0.38), “Giving a clear instruction” (0.40) and “Adaptive teaching” (0.38).

The effect size are medium (> 0.49 and < 0.80) on the scales “Activating pupils” (0.55) and “Teaching learning strategies” (0.51).

The small effect sizes (> 0.19 and < 0.50) of the growth in basic teaching scales are understandable, since the pre-tests scores in these skills were somewhat on the high side. This might be an instance of “ceiling” effect.

The highest growth is reached on the more complex scales of “Activating pupils” and “Teaching learning strategies.” Due to adequate coaching, student teachers are able to develop these complex skills more easily.

“Adaptive teaching,” as already mentioned in the section effective teacher behavior, contains teaching skills that are particularly difficult to master for student teachers (Van Geel *et al.*, 2019). These skills require thorough knowledge of the abilities of the pupils in the classroom, whereas they only visit them once or twice a week. Even for their mentors, functioning as role models, these skills are quite difficult to perform.

Conclusion

This study aimed to answer the question, what progress student teachers make during one academic year, while being trained in a professional learning community, using objective classroom observation, using lesson preparation templates that match their developmental stage and stage focused mentor feedback.

A professional learning community, consisting of educators from the teacher training college and internship schools, provided a mutual framework on what is considered “good teaching.” In the community observation consensus was reached to 83 percent, which corresponds with 0.66 Cohen’s κ , indicating “substantial agreement.” All actors involved were trained accordingly this norm.

ICALT scales	Pre-test		Post-test		Sign	Difference	
	<i>M</i>	(SD)	<i>M</i>	(SD)		ES	Cohen’s <i>d</i>
Creating a safe and stimulating learning climate	3.53	(0.48)	3.68	(0.44)	0.011	0.33	Small
Efficient classroom management	3.03	(0.63)	3.26	(0.57)	0.001	0.38	Small
Giving a clear instruction	3.08	(0.65)	3.32	(0.55)	0.000	0.40	Small
Activating pupils	2.73	(0.66)	3.08	(0.62)	0.000	0.55	Medium
Adaptive teaching	2.33	(0.88)	2.67	(0.91)	0.000	0.38	Small
Teaching learning strategies	2.29	(0.77)	2.69	(0.81)	0.000	0.51	Medium
Pupil engagement	3.20	(0.58)	3.40	(0.57)	0.000	0.35	Small

Table IV.
Growth of the
teaching skills and
pupil engagement
between the pre-test
and post-tests on all
six ICALT scales
($n = 101$)

On the basis of the data-driven feedback model, data retrieved from classroom observations linked both student teachers' learning environments, giving student teachers the opportunity to receive effective feedback focused on their individual developmental stage.

The progress of the teaching skills measured in effect sizes (Cohen's δ) in this study is small (> 0.15 and < 0.45) on the scales "Creating a safe learning climate" (0.33), "Efficient classroom management" (0.38), "Giving a clear instruction" (0.40) and "Adaptive teaching" (0.38).

The progress of the teaching skills measured in effect sizes is medium (> 0.45 and < 0.89) on the scales "Activating pupils" (0.55) and "Teaching learning strategies" (0.51).

Studying which step in the professional learning community (observation, assignment and use of the appropriate template and stage-focused mentor feedback) is in fact responsible for the effects found, would be interesting. However, these steps are fully implemented (almost 100 percent, see also the implementation section), which is of course important in order to be able to attribute the effects found to the intervention. Analyzing which step correlates the most with the effects found does require variance in the implementation. Furthermore, the different steps are also highly inter-correlated, meaning that it is not possible to perform the feedback procedure on the templates without the actual observation or the assignment of the appropriate template.

A possibility to find out more about the effectiveness of the different steps is performing successive experiments in which the intervention itself is varied. In the next section, we therefore compare the effects found in this study to a previous study performed in which a fourth step was added; additional meetings at the teacher training college.

Discussion

Theoretical implications

Little is known about the actual level of student teachers' teaching skills in elementary education through observation. Such knowledge, based on the observation of teaching skills of student teachers, is essential, given the desire to increase the teaching quality of student teachers.

A previous study with a quasi-experimental design showed that student teachers ($n = 135$) (trained with classroom observation, the assignment of an appropriate lesson template, mentor feedback and additional theoretical meetings linking theory to student teachers practice) achieved a higher level in teaching compared to student teachers in the (rather small) control group ($n = 63$) that were not trained in this way (Tas *et al.*, 2018). The student teachers in the experimental group showed in the six domains of the ICALT observation instrument a growth of an effect size between 0.81 and 1.12, which is a large growth. The growth of teaching skills of the student teachers in the control group of this previous study only showed a small growth on two scales: "Giving a clear instruction" (effect size = 0.19) and on "Teaching learning strategies" (effect size = 0.24). On the other four scales the student teachers in the control group grew with an effect size smaller than 0.15 which is according to Lipsey (1990) a negligible effect (see also Table AIII in which all ICALT averages on the pre-test, post-tests, the SD, the significance and the effect sizes of the groups are shown).

It is important to stress the fact that the teacher training college did, however, request a more manageable and less extensive training situation than during the previous study. Thus, it became theoretically relevant to study what progress student teachers could make, while being trained in a professional learning community without the additional extensive meetings for student teachers at the teacher training college.

In the present study ($n = 101$), effect sizes on the six ICALT scales are measured between 0.33 and 0.55, which is larger than the control group and smaller than the experimental group in the previous study. The main difference in the training situation of the experimental group in the previous study and the student teachers in the present study

($n = 101$) lies in the additional meetings at the teacher training college, in which practical results from classroom observations were further processed, by linking theory taught at the teacher training college to teaching practice at the internship schools. Due to the absence of a control group in the present study, it remains difficult to indicate causal relations. This would require additional research into the objectively observed development of student teachers' teaching skills. Further research could for instance answer the question; whether theoretical support at the teacher training college, which is specifically linked to practical results from classroom observations, does indeed lead to a doubling of the effect achieved by classroom observation, the assignment of an appropriate lesson template and mentor feedback alone.

Practical implications

Teacher training colleges and internship schools are constantly searching for ways to collaborate more closely in order to improve the quality of teaching of their student teachers. The process of building a professional learning community together can be of inspiration. In our case, for instance, it inspired mentors, internship coordinators, college teachers and student teachers to toe the same line, reaching mutual agreement on organizational aspects as well as on qualitative and quantitative standards regarding observation and feedback. The mutual effort of reaching an 83 percent consensus in the training sessions on what is considered "good teaching" has likely contributed to a shared sense of purpose.

The collaboration within the professional learning community has also contributed to the professional development of all training partners themselves. In this process the members of the training community became learners themselves, which proves to be effective in increasing the learning outcome of pupils (Hattie, 2008). The research team for instance, trained the internship coordinators in the observation of effective teaching skills and the internship coordinators further guided the mentors in their schools concerning these complex teaching skills (Van Geel *et al.*, 2019). The college teachers, collaborating with the internship coordinators and the mentors, became better aware of what was essential to teach to student teachers at the teacher training college.

Student teachers did point out that they benefitted from the mutual agreements in the training community; one student teacher, for instance, stated during reflection: "The observation and discussion with the internship coordinator really was useful for me and the mentor" and "Earlier on, I did not even know we had an internship coordinator working at the school." Various student teachers have indicated that having a series of lesson templates matching their development stage, worked stimulating in their learning process. Others mentioned that the employment of ICALT skills as learning objectives provided them and their mentors with clear directions.

Another group of student teachers that could benefit from the collaboration in the professional leaning community is worth mentioning. It concerns an increasing group of pre-selected and highly educated student teachers currently being trained on the job because of the pressing teacher shortness in the Netherlands. Research into their observed level of teaching skills would be interesting in order to improve their training situation.

Finally, this study has given new insights in the effectiveness of a research response to the teacher training college's question, asking for a less extensive and more manageable version of the teacher training situation. Creating a teacher training situation with less demand on the teacher training college did indeed prove possible, reaching small and medium effect sizes.

Inspired by the newly strengthened collaboration and grown confident by the results found in these studies, however, the Curriculum Commission of the teacher training college has decided to implement the more extensive approach for all student teachers.

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Observation lesson template 2	
The ICALT items can be scored on a 4-point scale: predominantly weak (1); more weaknesses than strength (2); more strength than weaknesses (3); and predominantly strong (4).	
Mentor scores:	Mark three ICALT items to be practiced during the lesson. Student teacher:
1-2-3-4	explains the lesson objectives at the start of the lesson
1-2-3-4	gives well-structured lessons
1-2-3-4	checks during instruction whether students have understood the subject matter
1-2-3-4	ensures effective classroom management
1-2-3-4	uses learning time efficiently
1-2-3-4	clearly explains teaching tools and tasks
1-2-3-4	asks questions that encourage students to think
1-2-3-4	involves all pupils in the lesson
1-2-3-4	stimulates thinking through possible solutions
1-2-3-4	encourages pupils to do their best
1-2-3-4	encourages the use of checking activities
1-2-3-4	checks during processing whether students are carrying out tasks properly
1-2-3-4	checks whether the lesson objectives have been achieved
Feedback	After the lesson
ICALT skills accomplished?	(yes/no (mark your answer) <i>Good work! I am very pleased to see your progress in the teaching skills you planned to practice! Extra compliment for the lesson structure. Like last week's feedback, today's lesson was really build up from a short instruction, guided practice and the processing of the instruction.</i>
Analysis	+ (reason) <i>Well-structured lesson: You really followed the structure of the direct instruction. I am glad that you have skipped the last sentences you prepared for in your instruction, though. It would have been too much for the children to comprehend at ones.</i> <i>Ensures effective classroom management: You thought about the extra books in advance, good work. Next time you can chose to make copies, (sometimes the parallel group needs its own books). The rehearsal of the poem afterwards was a clever move!</i> <i>Involves all pupils: The use of the smartboard to involve all the children during instruction really helped! You also handled the turn changing system well, so everyone was involved during instruction. Good last joke!</i>
	- There are several teaching skills left to master in this lesson form. Please focus next lesson on the teaching skill: 'encourages the children to do their best'. Do not hesitate to insist that all students must do their best.
Consequences for the next lesson(s)	Practice the encouragement of children to do their best in the next lessons, by: Knowing preciously what you want the children to deliver. Write down concretely in your preparation, what assignment you want them to do. Prepare what you are going to say when they indeed deliver and what if they do not. Please send me your preparation for next lesson in advance. Thank you.

Table AI.
Observation and feedback

Table AII.
Lesson preparation

Preparation lesson template 2			
Student teacher	S.L.	Subject matter	Dutch language: indirect subject
Mentor	V.M.	Group & date	Group K-12, on 27 mei 2015
School	The Rainbow Elementary school	Amount of pupils	33
Entry level	The children are already taught to find in a sentence, the finite verb, the object and the direct subject.		
Lesson objectives	After this activity, the pupils can find the indirect subject in Dutch sentences.		
Evaluation objectives & Consequence	How do you evaluate whether the lesson goals have been reached? After processing, we centrally check sentences (7-9). I also check the textbooks (Afterwards) To what extent has the goal been achieved and what is the consequence for the next lesson? The goal was largely achieved. No further repetition is needed.		
Lesson organization	Which rules and agreements are necessary to achieve maximum time on task? During instruction, time pupils cannot use the bathroom. During processing, pupils use the whisper voice. When they are finished with their work, they can learn their lines of the musical poem. Which materials and didactical materials do you need? The smartboard, Van den Berg (2016), <i>Language story</i> Thieme Meulenhoff 33 textbooks and notebooks. I borrowed 7 textbooks from group K12 B, next door. During gymnastics I will return the textbooks to teacher Z. How do you distribute materials and collect finished work? The group already have the textbooks. I will ask M. to distribute all textbooks. The pupils still have their notebooks in their drawer. I will ask M. to collect the notebooks afterwards.		
Time	Lesson phase	Concretely write down what you say, do, ask and demonstrate and what you expect from your pupils.	
5'	Orientation	(Explain the lesson goals and activate prior knowledge.) I say: Today's lesson is about finding the indirect subject in a subject. Last lessons you learned about finding the finite verb (FV), the object and the direct subject in a sentence. Now we will learn to find the indirect subject. On the smartboard, I write: Group K-12 goes on a field trip. I ask: which help-sentence is there to find a finite verb and which sentence for the subject? I ask one pupil by drawing a name tag from the jar. I wait for 10 seconds and I say: If correct? Yes, very good, by asking: who or what ...?	
10'	Instruction	(What do you say, demonstrate and ask? What do the pupils do?) I say: now we will start with learning to find the indirect subject in a sentence. I say: the phrase in the sentence often starts with 'to', but this is not always the case. If 'to' is not there, you can often think it present. You will find the indirect subject by asking this help sentence: I write this on the smart board, while will talk aloud: (To) who or what + finite verb and other verbs + subject + direct object I write down the sentence: Teacher V. gives high school advice to the pupils in group K12. I start with naming the finite verb and together we repeat the help sentences to find the object, the direct object and the indirect subject. I constantly repeat the help sentences and ask the group: What sentence have you used to find this.	
10'	Guided practise	(What do you say, demonstrate and ask? What do the pupils do?) I repeat two more sentences this way: 1. Henry wanted to buy teacher V. a present for his coming birthday; 2. Please lend some textbooks to group K12. I use the answering stick. I ask: do you think you can find the indirect subject on your own? I say: You can start with the sentence now. When you have finished the last sentence, please check your answers. Afterwards you can take the poem for the musical we are rehearsing and learn your lines.	
15'	Processing	(How do you guide the pupils, during processing?) I say: Do you think you can finish the sentences by yourself? (I monitor who needs extra attention during processing those). I say: Ok, you can now finish the assignments in your textbook. I say: You all know the rules: discuss the problems you might have with your neighbour in your whisper voice. When your question is still not solved, please put up your question mark sign. I walk through the classroom in a pattern, starting at my right. I check whether the pupils started all right. I will answer short questions during my rounds. I will repeat the help questions: (To) who or what + finite verb and other verbs + subject + direct object. I say: Ok, class, finish your last sentence and watch the smartboard.	
8'	Feedback & Evaluation	(Check with the pupils whether the lesson goals have been achieved.) I chooses the three most difficult sentences (7a, 8d and 9c) centrally. I evaluate the work by asking: 'could you find the indirect subject in all sentences easily?' I ask: can you repeat the help sentence to find the indirect subject? I expect that there are no difficulties left! I ask: 'Who finds this difficult?' I say: (+) Good work or (-) that is all right, I will help you next lesson. I say: class, you all worked very hard and you have finished all sentences. I give (to you) a compliment. I will explain the joke when they do not get it.	
2'	Change of activity	(Include cleaning up and preparing for the next activity.) I say: M, please collect all notebooks so I can check them. Take your gymnastic bag and join the line as agreed.	

n	Control group (Business as usual)				Three-step intervention				Four-step intervention			
	Pre-test 63	Post-test 63	Difference	ES	Pre-test 101	Post-test 101	Difference	ES	Pre-test 135	Post-test 135	Difference	ES
ICALT	M (SD)	M (SD)	Sig.	ES	M (SD)	M (SD)	Sig.	ES	M (SD)	M (SD)	Sig.	ES
Safe climate	3.27 (0.58)	3.27 (0.64)	0.97	0.00	3.53 (0.48)	3.68 (0.44)	0.01	0.33	3.23 (0.46)	3.63 (0.46)	0.00	0.81
Classroom management	2.73 (0.61)	2.80 (0.52)	0.49	0.12	3.03 (0.63)	3.26 (0.57)	0.00	0.38	2.71 (0.60)	3.31 (0.60)	0.00	0.98
Clear instruction	2.76 (0.60)	2.87 (0.59)	0.35	0.19	3.08 (0.65)	3.32 (0.55)	0.00	0.40	2.77 (0.55)	3.30 (0.55)	0.00	0.91
Activating pupils	2.27 (0.59)	2.33 (0.59)	0.60	0.10	2.73 (0.66)	3.08 (0.62)	0.00	0.55	2.28 (0.61)	3.04 (0.61)	0.00	1.09
Adaptive teaching	1.47 (0.58)	1.50 (0.64)	0.80	0.05	2.33 (0.88)	2.67 (0.91)	0.00	0.38	1.82 (0.85)	2.70 (0.85)	0.00	1.07
Learning strategies	1.74 (0.57)	1.88 (0.62)	0.16	0.24	2.29 (0.77)	2.69 (0.81)	0.00	0.51	1.86 (0.70)	2.69 (0.70)	0.00	1.12
Average effect size				0.14				0.43				1.00

Note: Data from the first and last group in this table are also published in *Journal of Educational Evaluation* (Tas et al., 2018) 58(8–16)

Table AIII.
Pre- and post-test averages, SD, significance and ES on the six ICALT scales of the three groups

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