Effects of an online- and video-based learning environment on pre-service teachers' self-efficacy beliefs, attitudes towards inclusion and knowledge of inclusive education during practical school experiences

Kira Elena Weber, kweber@leuphana.de
Christopher Neil Prilop, prilop@leuphana.de
Marc Kleinknecht, marc.kleinknecht@leuphana.de
Leuphana University Lüneburg
Institute of Educational Science
Universitätsallee 1, 21335 Lüneburg, Germany

Abstract: We examined the impact of an online- and video-based learning environment on pre-service teachers´ self-efficacy beliefs, their attitudes towards inclusion and their knowledge of inclusive education before and after a teaching practicum. While pre-service teachers in the control group (CG) received a conventional practicum supervision (n = 48), pre-service teachers in the intervention group (IG, n = 41) self-reflected online about challenging situations in teaching inclusive classrooms and received video-based peer feedback. All students had a significant increase of self-efficacy with regard to handling classroom disruptions and improved their knowledge of inclusive education after the teaching practicum. However, there were no differences between students in the CG and the IG. Implications of these finding are discussed.

Introduction

For many countries the inclusion of students with special educational needs (SEN) in mainstream schools is currently a priority on the political agenda. However, teaching in inclusive classrooms can be a challenging task for pre-service teachers (Weber & Greiner, submitted). Consequently, there is a growing body of research focusing on inclusive education and factors that support classroom practice in inclusive classrooms (for an overview see de Hehir et al., 2016). Successful implementation of inclusive teaching is based on positive attitudes towards inclusion and strong self-efficacy (SE) beliefs (van Mieghem, Verschueren, Petry & Struyf, 2018). Pre-service teachers' first teaching experiences have been shown to have substantial impact on their SE (Klassen & Durksen, 2014) and thus teaching in inclusive classrooms can influence attitudes towards inclusion and SE. Moreover, knowledge of inclusive education can be generated during a teaching practicum by solving problems that engage students actively. In a recent study Weber and Greiner (submitted) showed that pre-service teachers' SE increased significantly due to their first teaching experiences, whereas attitudes remained the same or decreased. Enhancing teaching practicums with digital learning environments has proven beneficial in other areas of pre-service teachers' competence (e.g. Weber, Gold, Prilop & Kleinknecht, 2018). However, despite the increasing use of digital media and online learning environments in teacher education research has not focused on analyzing the impact of online- and video-based learning environments on pre-service teachers' SE, attitudes towards inclusion and knowledge of inclusive education during a teaching practicum. To close this research gap, we conducted a quasi-experimental pre-post-study and pursued the following research question: What impact does an online- and video-based learning environment (IG) have on pre-service teachers' SE, their attitudes and their knowledge about inclusive teaching compared to conventional practicum supervision (CG)?

Pre-service teachers' self-efficacy beliefs

Teacher self-efficacy is "a judgement of his or her capabilities to bring about desired outcomes of student engagement and learning, even among those students who may be difficult or unmotivated" (Tschannen-Moran & Woolfolk Hoy, 2001, p. 783). High SE can predict academic and occupational success (Vieluf, Kunter, & van de Vijver, 2013). Moreover, research has shown that pre-service teachers' SE correlate positively with their

commitment to the teaching profession (Klassen & Chiu, 2011) and negatively with burnout and their intention to quit the teaching profession (Fives, Hamman & Olivarez, 2007). Soodak and Podell (1993) investigated the influence of SE on teachers' placement and special education referral. Their research indicated that teachers with high SE were most likely to agree with regular class placement for students with learning and/or behavior problems.

Teachers attitudes towards inclusion and knowledge of inclusive education

Attitudes "refer to perceptions, views, beliefs, feelings, and the predispositions of actors towards something or someone" (van Mieghem et al., 2018, p. 6) and comprise cognitive, behavioral and affective components. Moreover attitudes can either be student- or teacher-focused (Seifried & Heyl, 2016). Teachers who hold positive attitudes towards inclusion seem to have a positive influence on the attitudes of their colleagues, parents and students (Hehir et al., 2016). Moreover they are more likely to adapt their lessons to the needs of all students (Sharma, Forlin & Loreman, 2008). Beside positive attitudes, teachers need professional knowledge to master challenging situations in inclusive classrooms successfully (König, Ligtvoeta, Klemenza & Rothland, 2017). Furthermore, teachers with more knowledge of inclusive education seem to feel more positively about the inclusion of students with SEN (Hehir et al., 2016). Hence, SE, attitudes and knowledge of inclusive education are significant factors to take into account when discussing the outcomes of pre-service teachers´ academic education.

Practical school experiences in teacher education

Teaching practicums can provide the sources of teachers' SE such as mastery and vicarious experience, verbal persuasion in the form of feedback, and physical reactions (Bandura, 1997; Tschannen-Moran, Woolfolk Hoy & Hoy, 1998) and foster pedagogical knowledge (König, Darge, Klemenz & Seifert, 2018). However, whereas positive teaching experiences can promote high SE in pre-service teachers, negative experiences may lead to low SE (Flores, 2015). Moreover, pre-service teachers' SE and also their attitudes can decrease when the teaching practicum is not sufficiently scaffolded (Tschannen-Moran et al., 1998; Weber & Greiner, submitted). Thus, mastery experiences should be combined with adequate coaching sessions in order to increase pre-service teachers' SE (Tschannen-Moran & McMaster, 2009). Traditionally coaching sessions during a teaching practicum take place immediately after the observed teaching performance in form of face-to-face coaching. However, this approach has some limitations because it requires time and cost consuming coordination (Lee & Wu, 2006). Online- and video-based learning environments can overcome these limitations because, in contrast to real-time face-to-face interactions, web-based platforms have the advantage of being time and location independent (Hixon & So, 2009).

Online- and video-based learning environments during a teaching practicum

Previous research has shown that online and video-based learning environments can enhance professional competences of pre- or in-service teachers (Gaudin & Chaliès, 2015; Gold, Hellermann, & Holodynski, 2017; Weber et al., 2018). Two types of videos can be differentiated: classroom videos of peers or unknown teachers and classroom videos of one's own teaching (Major & Watson, 2017). Classroom videos of others provide vicarious experiences and thus can have an impact on pre-service teachers' SE and their attitudes towards inclusion. Analysing one's own teaching has the advantage that prior experiences and knowledge are activated (Kleinknecht & Schneider, 2013). Therefore, it can be assumed that analyzing own videos can activate and enhance knowledge of inclusive education. However, the reflection and analysis of videos of own teaching can be cognitively and emotionally challenging (Kleinknecht & Schneider, 2013) which can result in a decrease of SE and attitudes. On the other hand, verbal persuasion in the form of evaluative feedback can enhance SE (Weber, Prilop & Kleinknecht, submitted) and using own videos can help teachers to trust the received feedback (Tripp & Rich, 2012).
In Germany pre-service teachers usually do their teaching practicums individually at different schools so that implementing online- and video-based learning environments can increase the opportunities for them to interact and form a learning community (So, Pow & Hung, 2009). By participating on digital platforms pre-service teachers can observe a higher amount of effective and ineffective teaching practices which creates "a knowledge base for teaching" (So, Pow & Hung, 2009, p. 783). Moreover, "reflective dialogue can be tailored to a specific type or scenario of teaching" (Wu & Kao, 2008, p. 54), such as challenging situations in inclusive classrooms. In addition, video sequences can reduce complexity (Derry, Sherin, & Sherin, 2014) and feedback can be received. Knowledge of inclusive education can be fostered when providing peer feedback and being inspired by the peers' different approaches (Li, Liu, & Steckelberg, 2010). In a recent study, **Gold et al.** (2017) found that pre-service teachers, who analyzed their own classroom videos as well as videos from other teachers in a university course, had a significantly

higher increase in **SE** than a control group. These results could not be found for pre-service teachers in the course with own teaching elements but without video analysis. However, so far research has not focused on whether online- and video-based learning environments can contribute to pre-service teachers' **SE**, their attitudes and their knowledge of inclusive education in comparison to traditional face-to-face coaching sessions

Method

Participants in our study were 89 Bachelor students from a German university in their forth semester of teacher education who took part in a four-week teaching practicum. According to the practicum regulations, students have to plan and organize four lessons on their own. 41 students (78% female, M_{age} = 22.10, SD_{age} = 3.17) volunteered to videotape themselves during the teaching practicum (IG) and were supervised by university teachers. Each student in the IG was observed once in school during his or her own lesson by the university supervisor and a peer and subsequently received face-to-face peer and expert feedback. In addition to this face-to-face coaching, pre-service teachers in the IG videotaped their teaching practice twice. They then selected a 5–10 min sequence of each lesson and uploaded this sequence to the digital learning platform Moodle. The sequence should show a challenging situation in an inclusive classroom. Each student added a self-reflection to the selected video sequence. Pre-service teachers were supposed to observe at least two video sequences and read their peers' self-reflections in order to provide feedback. The control group (CG) consisted of 48 students (85% female, M_{age} = 21.94, SD_{age} = 2.23) and received two class visits from their university supervisor and face-to-face peer and expert feedback. Students in the CG did not have access to the digital platform.

To measure pre-service teachers' *SE* we used two subscales from a German language questionnaire by Bosse and Spörer (2014). Attitudes were measured with the "Questionnaire on Attitudes towards Inclusion for Teachers" (Seifried & Heyl, 2016) which comprises two student-focused factors, i.e., "*Promoting academic competencies in inclusive classrooms*" and "*Social inclusion in school*", and the teacher-focused factor "*Individual readiness for inclusive education*". All factors represent cognitive and behavioral-affective attitude components. The items from both questionnaires were rated on a 6-point response scale ranging from "I don't agree at all." (1) to "I fully agree" (6). *Knowledge about inclusive teaching* was measured with a test by König and Blömeke (2010) with nine one-choice items. For the right answer students received 1 point, so that a total of nine points could be achieved. The first survey was conducted online at the beginning of the semester in April 2018. The posttest was conducted in the week following the end of the teaching practicum in September 2018 (for details on the scales see tab. 1). Results of the pretest showed that the two groups did not differ from each other with respect to knowledge of inclusive education, self-efficacy beliefs and their attitudes towards *social inclusion in school* at the beginning of the semester. However, students in the IG showed significantly ($p < .01$) higher attitudes regarding the subscales p*romoting academic competencies in inclusive classrooms* and *individual readiness for inclusive education* (see tab. 2 for descriptive statistics).

Table 1 Scales, sample items and internal consistency coefficients

Subscales	Items	Sample items	α_{t1}	α_{t2}
Self-efficacy with regard to the arrangement of inclusive education	4	I feel confident in organizing my lessons in a way that even children with special educational needs achieve their learning targets at their own pace.	.84	.86
Self-efficacy with regard to the handling of classroom disruptions	4	I am able to calm down a disturbing child.	.80	.82
Promoting academic competencies in inclusive classrooms	6	Children with special educational needs would be better supported in an inclusive classroom.	.79	.82
Social inclusion in school	4	Children with special educational needs would feel alone and excluded in an inclusive class (recoded).	.79	.80
Individual readiness for inclusive education	5	I perceive teaching in an inclusive class as too demanding for me (recoded).	.81	.80
Knowledge about inclusive teaching	9	As a teacher, how can you ensure that your students have enough time to learn?		

Results

To investigate whether groups changed significantly from pre- to post-test, we conducted t tests for paired samples and calculated effect sizes. Results show that students in both groups significantly enhanced their *knowledge* and their *SE with regard to the handling of classroom disruptions* with a large effect size. *SE with regard to the arrangement of inclusive education* as well as attitudes towards *social inclusion in school* increased only in the CG, whereas attitudes towards *promoting academic competencies in inclusive classrooms* decreased significantly in the IG. However, our analyses show that pre-service teachers in the IG reported significantly higher attitudes regarding this subscale in the pretest. In addition, IG members showed descriptively higher scores in pre- and posttest for all subscales of self-efficacy beliefs and attitudes towards inclusion (see tab. 2).

Table 2 Means (M), standard deviations (SD) and effect size for repeated measures (d)

	Pre-test		Post-test						
	M	*SD*	*M*	*SD*	*Δ*	*t*	*df*	*p*	*d*
Self-efficacy with regard to the arrangement of inclusive education (SE AIE)									
CG	3.56	1.07	3.96	0.82	0.40	3.17	47	<.01	.418
IG	3.95	1.01	4.01	1.11	0.06	0.39	40	.702	.064
Self-efficacy with regard to the handling of classroom disruptions (SE CD)									
CG	3.68	0.85	4.17	0.86	0.49	4.31	47	<.01	.626
IG	3.70	0.88	4.35	0.78	0.66	3.85	40	<.01	.565
Promoting academic competencies in inclusive classrooms (Promoting)									
CG	3.31	0.96	3.42	0.81	0.12	0.92	47	.363	.124
IG	3.82	0.79	3.52	0.92	-0.30	-2.0	40	<.05	-.339
Social inclusion in school (Social inclusion)									
CG	4.26	0.90	4.46	0.76	0.21	2.03	47	<.05	.275
IG	4.48	0.87	4.55	0.75	0.07	0.55	40	.587	.080
Individual readiness for inclusive education (Individual readiness)									
CG	3.68	0.97	3.85	1.03	0.18	1.51	47	.138	.225
IG	4.22	0.96	3.99	1.06	-0.23	-1.7	40	.107	-.273
Knowledge about inclusive teaching (Knowledge)									
CG	4.73	1.73	5.83	1.60	1.10	3.99	47	<.01	.660
IG	4.88	1.71	5.78	1.60	0.90	2.83	39	<.01	.544

To examine the intervention effects in detail, we calculated additional repeated measures ANOVA (see tab. 3). We set the alpha level at $p < 0.05$ for all statistical analyses. Sphericity was given in all the ANOVAs. Results concerning *SE with regard to the handling of classroom disruptions* and *knowledge about inclusive teaching* confirm our findings from the previous section with main effects of time. Furthermore, significant interaction effects of time × group were found for *promoting academic competencies in inclusive classrooms* and *individual readiness for inclusive education*. Participants of the CG performed significantly better than pre-service teachers in the IG. However, this effect can most likely be ascribed to the significant pretest differences between the groups.

Table 3 Results of repeated measures analysis of variance for the intervention effect

	Main effect Time			Main effect Group			Interaction effect Time × Group		
	F	*p*	η_p^2	*F*	*p*	η_p^2	*F*	*p*	η_p^2
SE AIE	5.33	<.05	.06	1.34	.25	.02	2.89	.093	.03
SE CD	32.84	<.01	.27	0.42	.518	.01	0.71	.401	.01
Promoting	0.86	.356	.01	3.67	.059	.04	4.52	<.05	.05
Social inclusion	2.88	.09	.03	0.97	.327	.01	0.66	.417	.01
Individual readiness	0.09	.76	.00	3.12	.08	.04	5.06	<.05	.06
Knowledge	22.83	<.01	.21	0.02	.879	.00	0.24	.628	.00

Discussion

Overall, our results show that *SE* and *knowledge of inclusive education* can be fostered by practical experiences during a teaching practicum. These findings align with previous studies (König et al., 2018; Weber & Greiner,

submitted). Regarding our research question about the impact of an online- and video-based learning environment on pre-service teachers' *SE*, their *attitudes towards inclusion* and their *knowledge about inclusive teaching* our assumptions could not be confirmed. However, we have to consider that the pre-service teachers in our study participated voluntarily on our video based digital platform and that they showed more positive *SE* as well as *attitudes towards inclusion* than pre-service teachers in the CG. Therefore, it can be assumed that the pre-service teachers in our IG encountered a kind of reality shock due to their high beliefs before their practical experiences (Pendergast, Garvis & Keogh, 2011). Moreover, it can be hypothesized that analysing one's own classroom videos as well as videos of peers reinforces this reality shock, because pre-service teachers were required to focus on challenging events in the classroom. It also has to be taken into account that the teaching practicum only lasted four weeks. As a reality shock, especially of pre-service teachers with positive attitudes to inclusion, can be expected, future research should investigate whether long-term video-based interventions result in different effects.

Another factor that should be taken into account is the quality of the video-based self-reflection and the peer feedback. Because the analysis of one's own teaching can be cognitively challenging (Kleinknecht & Schneider, 2013), pre-service teachers need support while reflecting on complex teaching situations in inclusive classrooms. In our study pre-service teachers in the IG received feedback from peer pre-service teachers as support. However, pre-service teachers are still novices and research indicates that experts and novices differ in their knowledge of inclusive education as well as in their professional vision (Wolff, Jarodzka & Boshuizen, 2017). Furthermore, Prins, Sluijsmans & Kirschner (2006) were also able to show that the quality of feedback differs significantly between novices and experts. Therefore, pre-service teachers need not only to be equipped with knowledge of inclusive education before providing feedback; they also need to be trained in their professional vision and in their feedback skills. In a recent study we found that video-based expert feedback can enhance SE of classroom management more than video based peer feedback (Weber et al., submitted). This also indicates that our digital learning environment might not have had enough scaffolds (Tschannen-Moran et al., 1998). The videos of their own teaching could have been too challenging for the pre-service teachers on a cognitive and emotional level (Kleinknecht & Schneider, 2013). Future research should therefore focus on the impact of video based expert feedback and additional scaffolds on *SE*, *attitudes towards inclusion* and *knowledge of inclusive education* or investigate if an appropriate peer feedback and professional vision training can ensure high quality peer feedback regarding inclusive education.

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