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Teachers' online teaching expectations and experiences during the Covid19-pandemic in the Netherlands

Irene van der Spoel, Omid Noroozi ⓘ, Ellen Schuurink and Stan van Ginkel

ABSTRACT
The COVID19-Pandemic has forced educators to transform their lessons into online versions in a short period of time. This study compares teachers' perception regarding their online teaching expectations (prior to the transition to remote teaching) and experiences (after a month of online teaching). Two surveys were completed by 200 Dutch teachers. Results demonstrated a significant change in the perception of teachers regarding their resolutions to implement technology in their lessons in a post-corona era. In this regard, teachers' gender and prior experiences with the use of ICT seem to play a small role. Findings of this study provide implications for the professionalisation of teachers, such as characteristics of teachers and intentions to implement technology in teaching, as well as experienced positive and negative aspects of online teaching. Future research should focus on constructing and testing educational design principles for effective professionalisation of teachers in adopting technology in their educational practices.

Introduction

The COVID19-Pandemic caused many educators to suddenly teach their lessons online, which '(. . .) entails opportunities to reshape education, teacher education and educational institutions' (Flores 2020). The brief transitioning period from regular to remote teaching created an urgency for professionalisation of teachers in terms of digitalisation. However, the implementation of technology has been an objective for educational institutes internationally (e.g. ISTE 2016; U.S. Department of Education 2017), as well as in the Netherlands (e.g. Huygen 2017; Rijksoverheid 2019) for a longer period of time.

Although traditional pedagogical technologies such as a Smartboard or PowerPoint are widely accepted and used, the actual integration of technology-supported teaching for pedagogical purposes is yet another level (Bruce and Hogan 1998; Ertmer and Ottenbreit-Leftwich 2010; Romeo, Lloyd, and Downes 2012). Whereas the integration is essential for constructing and strong online learning environment. Due to the unprecedented situation, characteristics of regular professionalisation programmes did not apply. Hence, the claim for extensive training to implement technology in teaching (Amhag, Hellström, and Stigmar 2019) can be discarded in this unique situation, the pandemic. Educators were forced to start teaching remotely within a short time span, even though most educational institutes, their digital learning environments, and their support

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systems were not fully ready. Leading to a heavy burden on teachers, who sometimes lack the social-emotional competencies to cope with such circumstances (Hadar et al. 2020). In the Netherlands, most teachers and organisations had about three days to learn and prepare. This was mostly an individual or team effort without having sufficient expertise and support available, as would have been organised in a planned setting. This unique situation provides an unprecedented insight into teachers' professionalisation when it comes to digital teaching.

Research shows that students are mostly sufficiently skilled to take part in digital lessons, but the development of these lessons by teachers turn out to be a lot more difficult (Aslan and Chang 2015). In most studies concerning Information Communication and Technology (ICT) in education (e.g. Chinyamurindi and Shava 2015; Noroozi 2018), the focus is on students as end-users, even though teachers have an important role in the effective delivery of ICT in the classroom (Albugami and Ahmed 2015; Tiba, Condy, and Junjera 2016). Most teachers nowadays are digital literate, but it is still important to learn how ICT can be used effectively and meaningfully in the classroom (Angeli and Valanides 2009; Ertmer and Ottenbreit-Leftwicht 2010). Teachers generally express feeling unprepared to incorporate digital teaching techniques in their curricula (Coyle, Yañez, and Verdú, 2010). Not all educators experience the ICT the same way. Although some studies find gender differences (Yukselturk and Bulut 2009; 2007), findings remain inconclusive (Bidjerano 2005). However, past ICT experiences appear to be related to student teachers' computer efficacy, attitude towards computer in education, and prospective computer use (So et al. 2012). Research by Louws et al. (2017) showed that especially mid and late-career teachers had often included technology use in their objectives for professionalisation.

A deciding factor in teacher professionalisation when it comes to the incorporation of technology is teachers' perception of technology. According to Blignaut and Els (2010), teachers need to have adopted the 'life-long-learning' attitude, in order to fully engage with ICT-rich education. In general, an open attitude is needed in the adoption of technology. A model that can be used to map these attitudes is the Technology Acceptance Model, designed by Venkatesh and Davis (2000). This model addresses two beliefs: The perceived usefulness of the application, and the perceived ease of use of the application. This model can predict the teacher's attitude or behaviour towards incorporating new technology (Venkatesh and Davis 2000). Impeding factors for teacher professionalisation in terms of the integration of technology are first of all low expectations of the added value of ICT (Al-bataineh et al. 2008; Amhag, Hellström, and Stigmar 2019; Ottenbreit-Leftwich et al. 2010). Apart from that, a lack of support and collaboration with peers has also shown to slow down digitalisation of educational institutes (Ertmer and Ottebreit-Leftwich 2010). A third factor that has shown to hamper professionalisation is limited time to become familiar with technology (Almekhlafi and Almeqdadi 2010; Ungar and Baruch 2016), as well as a lack of knowledge and skills to support learning with use of ICT (Koehler, Mishra, and Cain 2013). A final impeding factor is absence of adequate training focused on teachers' teaching practice (Baran 2014; Hadar et al. 2020). A promoting factor is an extensive professionalisation programme (Amhag, Hellström, and Stigmar 2019) that focuses on the methodological integration of ICT as well as technical support (Ungar and Baruch 2016), and is directly relevant for educators' teaching practice (Forbes and Khoo 2015; Lakkala and Ilomäki 2015; Turel 2014). Apart from

that, studies stress that online interaction and communication to support learning with use of ICT should be part of a professionalisation programme (Amhag, Hellström, and Stigmar 2019; Wong et al. 2015). Lastly, Gu et al. (2012) claim that professionalisation to use technology in teaching is only effective when it is integrated in the teaching, learning, and professional development of teachers. However, implications and constructs for teacher professionalisation in terms of the implementation of technology in teaching remain fragmented and inconclusive.

Apart from a sense of urgency and therefore experienced added value of ICT, the short transitioning period due to the Covid19-pandemic has left many teachers unprepared. The objective of this study is to compare teachers' perception regarding their online teaching expectations and experiences in the unprecedented context of the Covid19-pandemic in the Netherlands. This aim has been subdivided into three research questions: 1. What are teachers' perceptions regarding their online teaching expectations and experiences, and how do these compare; 2. What are teachers' perceptions regarding the positive and negative aspects of online teaching, and how do these compare; 3. How does the Covid19-Pandemic affect teachers' intentions to use technology in teaching.

Because educators would become more aware of the possibilities and therefore added value of the use of technology, it was hypothesised that a difference will be measured between what teachers expect and actual experience, considering the personal characteristics and background. This hypothesis is aligned with Compeau and Higgins' theory (1995) and several other studies (e.g. Al-bataineh et al. 2008; Amhag, Hellström, and Stigmar 2019; Ottenbreit-Leftwich et al. 2010) that indicate that experienced added value is a key factor in the adoption of the use of technology in teaching. In addition, it was expected that educators would predict and experience a decrease in interaction in distance learning compared to their regular teaching (Halasa et al. 2020), and that time-saving and similar efficiency-related aspects of using technology would be noticed as well (Clark and Feldon 2014). Apart from that, it was hypothesised that resolutions to use more technology in future teaching would be noticeable. This is aligned with Compeau and Higgins' theory (1995) and several other studies (e.g. Al-bataineh et al. 2008; Amhag, Hellström, and Stigmar 2019; Ottenbreit-Leftwich et al. 2010) that indicate that experienced added value is a key factor in the adoption of the use of technology in teaching. The outcomes of this study provide insight into the effects of a forced change in teaching and could lead to implications for teacher education professionalisation in terms of digitalisation.

Method

Context and procedure

In order to compare educators' expectations and experiences as regards to remote teaching, to the experienced skills after a month of online teaching, two comparable surveys were conducted. The pre-test survey was posted two days after the Dutch government communicated that school buildings would close due to the spreading of the corona virus. An intelligent lockdown was instituted and considering the large number of people in school buildings, educators had to teach their lessons online. In order to elicit the perceptions of educators in varying educational sectors, the survey was

posted by the first author on the social media platform LinkedIn. This survey was closed after 291 submissions on 25 March[th]. During this period, most educators had not yet taught entirely remotely, although some had taught online for a few days. The collection period was intentionally short (8 days) to collect data before educators had acquired experience with remote teaching, to assure perception rather than experience was measured.

The post-test survey was only sent to the participants who completed the first survey, after a month of closure of school buildings (30 April). A reminder followed to those who did not respond after a week. It was closed after 200 submissions on 14 May. The closure date was chosen because of the number of respondents and because fewer restrictions in relation to school activities were announced. At the time, it was unclear whether schools would reopen soon, hence the survey was closed. A requirement to complete the post-test survey was to have taught remotely in the month prior.

Participants

The participants were Dutch educators, who have been requested to complete the survey if they had been involved in teaching in the past year. The survey was posted to LinkedIn, and was shared by various LinkedIn users' numerous times, leading to a random sample. Five per cent of the 200 participants were working in primary education. Twenty-eight per cent of the respondents were active in secondary education, 19% in vocational education, 40% in higher education, and 7% participants selected 'other'. Based on the provided email addresses, it was determined that teachers from 75 different organisations participated in the surveys. Sixty-one per cent of the participants were female, and 39% male. Prior to the Covid19-Pandemic, 17% of the participants used technology in less than 10% of their lessons. Twenty-five per cent or participants incorporated ICT in 11%-25% of their lessons, 28,5% claimed to use technology in 26%-50% of their lessons, and the remaining 29,5% claimed they used some sort of technology in over 50% of their lessons. Other information about the participants was not retrieved. The participants who did not complete the post-survey were eliminated from the dataset, which was done through matching email addresses for pairs.

Data collection, validity and reliability

Because of the unprecedented situation, no existing questionnaire was available to measure educators' perception of expectations and experiences. However, existing theories on aligning essential learning environment characteristics (Biggs 1996), developing competence (Mulder 2014) and adopting questionnaires in distance education (Tallent-Runnels et al. 2006) facilitated the construction of a set of questions. This study uses quantitative and qualitative data combined, to gain more insight into participants' motivation and underlying reasoning. The surveys have been kept very short, because teachers had to redesign their lessons during the same period as the pre-test. The pre- and post-test survey have the same set of questions. The verb tenses were changed in the second survey, and two open questions were added to generate more insight into teachers' motivation to use technology.

To increase the validity of the surveys, content validity was applied by consulting a group of eight experts in the field of educational research to review the questions and their alignment with the research objectives. Through written feedback and several focused discussions, one question was eliminated because it was deemed irrelevant. Apart from that, a definition of ICT-tools was added. Subsequently, face validity was applied through asking 10 educators to evaluate the surveys on alignment with research objectives and intelligibility of questions. Based on these reviews, a few questions were rephrased and elaborated on. The ranking questions used a Likert five-point scale in accordance with comparable studies in this field of research (Noroozi et al. 2018; Van Ginkel et al. 2020).

For the quantitative data, we calculated the reliability coefficient for both teachers' expectations (pre-test) and also teachers' experiences (post-test). The results showed a high reliability coefficient for both surveys on teachers' expectations and also experiences (Cronbach α = 0.78 and 0.80, respectively). The qualitative data have been analysed using inductive thematic coding (Bryman 2016), whilst taking the scope of this research into account. To increase reliability of the analyses, two of the researchers independently created codes based on part of the dataset, taking the scope of the study into account. After a focus-group discussion, the codes were finalised and used by one author to code the data. A random selection of data was coded by the second author as well. Comparing the analyses showed high agreement (Cohen's Kappa:.83; agreement 92%). Discrepancies were resolved through discussions.

Data analysis

Descriptive data such as frequency and percentage indicators were used to answer the first research question related to teachers' online expectations and experiences. Furthermore, ANCOVA for repeated measurements was used to discover if there is any significant change in the perception of teachers regarding their online teaching expectations and experiences prior to and after their remote teaching. Control variables included teachers' gender (female and males), their experiences with the use of ICT tool in education prior to remote teaching (low, medium, and high) and also the level of education (primary, secondary, vocational, and higher education).

Descriptive data such as frequency and percentage indicators were used to answer the second (positive and negative aspects of online teaching) and third (intended use of technology in education) research questions.

Ethical considerations

The integrity of the surveys was guaranteed through informing respondents about what their personal data would be used for, compliant to the GDPR and the Netherlands Code of Conduct for Scientific Practice (e.g. Van Ginkel et al. 2019). Apart from that, all data have been processed anonymously by allocating unique IDs, and the email addresses of the participants have only been used to distribute the post-test survey. Lastly, participants were informed about the objectives of the study, and gave explicit permission for their data to be used, before they entered any personal data.

Results

Results for research question 1

Overall, when taking control variables into account, teachers showed significant differences with respect to their online teaching expectations and experiences, *Wilks' λ* = .93, *F* (1, 196) = 14.60, *p* < .01, η^2 = .07. These differences were significant with regard to teachers' gender (*Wilks' λ* = .96, *F*(1, 196) = 8.62, *p* < .01, η^2 = .04) and their experiences with the use of ICT tools in education prior to remote teaching (*Wilks' λ* = .95, *F*(1, 196) = 11.46, *p* < .01, η^2 = .06). Teachers' online teaching expectations and experiences did not differ when controlling for different sectors in education (*Wilks' λ* = .99, *F* (1, 196) = 2.78, *p* = 10). Specifically, male teachers had more positive experiences than their expectations compare to female teachers. Furthermore, teachers with average amount of experiences regarding the use of ICT tools prior to remote teaching had a more positive experiences than teachers with high or low amount of ICT experiences. Table 1 distinguishes these differences among teachers regarding their gender, ICT experiences, and levels of education.

Results research question 2

This section describes findings from both the quantitative and qualitative data derived from analysing the adopted surveys. The first section focuses on significant differences between pre-test and post-test. The second section summarises the main findings relating to the qualitative data.

In the pre-data measurement, 25% of respondents mentioned that being forced to teach remotely would lead to the professionalisation of teachers, compared to 24% who experienced this increase (see Table 2). Another aspect that was mentioned frequently, was that teachers would become more aware of the possibilities of technology in education, and that the changed context would spark creativity in educators. The latter showed a decrease of 4% in the experienced positive aspects. Similar to in the pre-data measurement, participants wrote that the consequences of the school closures created an urgency for digitalisation to be implemented, which has caused innovation in organisations. However, this percentage showed a decline of 5%. An increasing number of participants in the post-test mentioned that educators are more aware of the possibilities of technology in education, because of remote teaching. Compared to the pre-data measurement, an increasing 5% of participants mentioned revaluating the methodology of teaching due to the transition to online teaching

Table 1 Mean scores and SDs related to perceived attitudes and skills on pre-test and post-test (reference to the questions in pre- and post-test mentioned in the table; n=200).

		Expectations		Experiences	
		Mean	Std. Deviation	Mean	Std. Deviation
Gender	Male	3.29	0.56	3.40	0.58
	Female	3.15	0.57	3.12	0.58
Level of education	Primary	2.90	0.64	2.75	0.69
	Secondary	3.19	0.58	3.31	0.58
	Vocational	3.31	0.57	3.19	0.68
	Higher education	3.23	0.54	3.25	0.52
ICT Expectation	Low	3.02	0.54	3.09	0.55
	Average	3.16	0.52	3.26	0.59
	High	3.59	0.47	3.44	0.62

Table 2 Expected and experienced positive aspects of online teaching (n = 200).

Categories positive aspects	Expected	Experienced	Difference
Professionalisation	25%	24%	-1%
Creates urgency	21%	13%	-8%
Innovation in organisations	13%	8%	-5%
Revaluation of methodology	11%	16%	+5%
Creativity increased	7%	3%	-4%
Aware of possibilities	7%	9%	+2%
Collaboration with colleagues	4%	2%	-2%
Ownership of student increased	5%	6%	+1%
More efficient	4%	6%	+2%
Differentiation	3%	4%	+1%
More flexible	4%	6%	+2%
More focus	3%	4%	+1%
Interaction	2%	10%	+8%
More effective	2%	2%	0
Future proof	1%	0%	-1%

as a positive aspect. Other experienced positive aspects were increased flexibility in learning and teaching, more opportunities for differentiation in lessons, and increased efficiency in working, teaching, and learning. Teachers also noted students took more responsibility for their learning.

At the start of the pandemic, participants also indicated negative aspects of the compulsory remote teaching (see Table 3). 38% of respondents mentioned that they feared that interaction between students and teachers, and amongst students, would decrease. This percentage increased with 8% after two months of online teaching. In addition, a group of teachers (7%) mentioned that they expected it would be more difficult to monitor students' well-being and learning processes, causing students to disappear off the radar. This was experienced very strongly (24%) in the post-data measurement. Another concern was that students and teachers would not have the required resources in terms of hardware and software to teach or follow classes (10%). However, this aspect was hardly experienced (2%). Participants also mentioned that the increased time pressure and the overload of information would be a negative aspect of sudden remote teaching. Twelve per cent of teachers mentioned that they feared they, or colleagues, would not be sufficiently skilled to teach online. A decline of 8% was found here as well. A smaller group of educators mentioned that the quality of education in general would decrease, and that some types of education such as practicals would not be possible online, which both showed a small increase. Lastly, a few educators

Table 3 Expected and experienced negative aspects of online teaching (n = 200).

Categories negative aspects	Expected	Experienced	Difference
Interaction	38%	46%	+8%
Time pressure	13%	10%	-3%
Not skilled enough	12%	4%	-8%
Overload	11%	10%	-1%
Limited resources	10%	2%	-8%
Difficult to monitor students	7%	24%	+17%
Decreased quality	4%	5%	+1%
Limited possibilities	3%	5%	+2%
Unfamiliar with methodology	2%	2%	0
Potential fraud in testing	2%	2%	0
Privacy intrusion	1%	3%	+2%
Less flexible	1%	0%	-1%

became more concerned about their privacy when teaching online and about fraud in online exams.

Research question 3

In the post-test survey, teachers reported to have the intention to use technology more after the COVID19-pandemic, compared to how often they used ICT in their lessons before the pandemic (see Table 4). The participants were asked to report on what objectives they wanted to use technology for. As presented in Figure 1, a large group of respondents mentioned giving instruction, (formative) testing, and giving feedback as objectives to use technology in teaching once back to school. Active learning and collaborative learning were mentioned relatively often as well.

   The data concerning motivation to implement technology in teaching for these objectives showed that increased efficiency was the largest factor in applying technology in teaching (see Figure 2). This efficiency was merged during coding and was composed of more goal-oriented teaching, as well as a time-saving aspect. Other factors were increasing students' motivation, offering a variety of learning activities by adding technology, and monitoring students' learning processes more easily. Followed by a lower frequency of respondents mentioning that the use of technology made their work easier and led to students taking more responsibility for their learning processes.

Table 4 The difference between integration of ICT in education before and after COVID-19 (n=200).

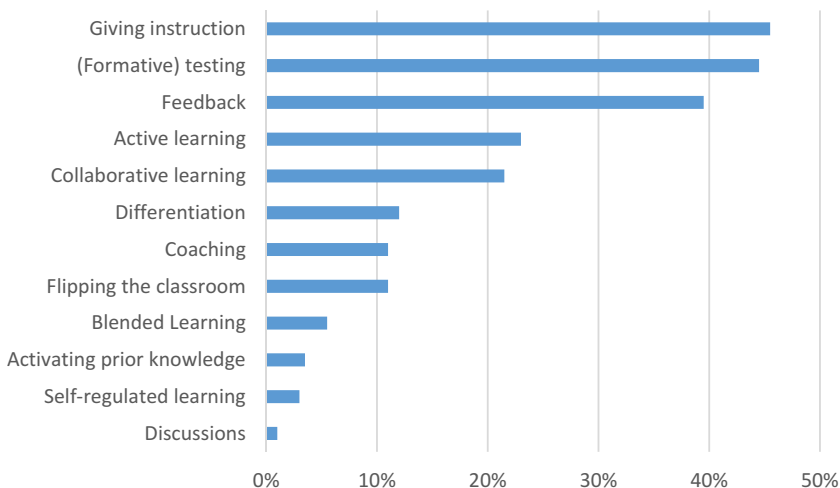| Percentages of lessons with ICT component	Percentage of participants who use of ICT before school closures	Percentage of participants who intend to use ICT after school closures
Low (<25%)	42%	32.5%
Medium (25%-50%)	28.5%	28%
High (>50%)	29.5%	39.5%

Figure 1. Teachers' objectives to use technology in teaching (post-test, *n* = 200).

Figure 2. Teachers' motivation to use technology in teaching (post-test, *n* = 200).

Conclusions and discussion

This empirical study aimed to compare teachers' expectations and experiences as regards to online teaching in the unprecedented context of the Covid19-pandemic in the Netherlands. The perceptions of 200 Dutch teachers were collected through pre-test and post-test surveys which were distributed via a social media platform. The conclusions are discussed for each of the three research questions that were presented in the introduction paragraph.

First, the main finding of this study concerns significant differences in teachers' perceptions with respect to their online teaching expectations and experiences. Prior experience plays a major role in this difference. Only educators who had medium experience with ICT experienced remote teaching more positively than they had expected. This result is in line with insights from previous studies in this field suggesting that if educators become more aware of possibilities of the use of technology, a difference will be measured between what teachers expect and their actual experience (e.g. Amhag, Hellström, and Stigmar 2019; Compeau and Higgins 1995; Ottenbreit-Leftwich et al. 2010). The groups of teachers who used ICT either rarely or extensively, both did not report a decrease or increase, which may be due to that they were already aware of the added value of technology, or because they did not experience it, possibly due to a lack of skills (Maksimovic and Dimi 2016).

Further, in line with the literature on teacher education, this study demonstrated that personal characteristics of teachers play a role in adopting technology in education. Differences between expectations and experiences were evident for both gender and teachers' experience with the use of ICT tools in education prior to remote teaching. Considering the latter, recent studies support the notion that teachers' experience with the use of ICT tools positively influences their perceptions regarding the adoption of technology in education (e.g. Amber et al. 2019; Maksimovic and Dimi 2016). Regarding gender, this study reported that male teachers had more positive experiences than their expectations, compared to female teachers. Gender differences relating to teachers' perceptions on the use of ICT are previously addressed by Yuen and Ma (2002), claiming

that perceived usefulness and ease of educational technology will more strongly influence the intention to use computers in educational practice for females than males. However, some studies claim the effect of gender differences remain inconclusive (e.g. Bidjerano 2005; Yukselturk and Bulut 2009, 2007). Other findings of this study revealed a lack of difference between teachers' online teaching expectations and experiences with regard to varying educational sectors. This might suggest that teachers' traits and prior competencies can be considered as more essential variables explaining teachers' perceptions in comparison to contextual or sectorial factors. However, future research should take more and other variables concerning these categories into account to test this assumption (see also discussion of reliability and validity aspects).

Concerning the expected and experienced positive and negative aspects of forced remote teaching, teachers frequently mentioned professionalisation as an expected and experienced positive aspect of the Covid19-pandemic. Initially, 21% of the teachers expected a higher sense of urgency to be created due to the new situation, but a decrease of 8% actually experienced it. The main negative aspect that was predicted and experienced in online teaching, was the lack of interaction. Even more teachers experienced this than was anticipated it. However, interaction was also reported as an unexpected positive experience, in the situation where introvert students were more present compared to a regular classroom context. Previous studies in this field support the need to critically encourage interaction between teachers and students in the context of online teaching (e.g. Amhag, Hellström, and Stigmar 2019). In line with this, Kuo et al. (2014) claimed that interaction is a critical factor in student satisfaction. Other researchers emphasise that in order to foster interaction amongst peers, teachers should critically pay attention to create a sense of community in online modules (McInnerney and Roberts 2004). However, following the findings of this study, in which teachers shared positive evaluations regarding interaction with introvert students, we suggest that more research should be conducted towards perceptions of students with varying personal characteristics, and learning and study preferences concerning interaction with their peers and teachers in online education. Further, other results show that teachers have experienced a lot of time pressure and increased workload during the pandemic. The extra time and effort that was invested could explain the increased perceived innovation and professionalisation in organisations. The urgency of the crisis created a unique setting that forced teachers to professionalise. Apart from that, the brief transition to remote teaching has caused many educators to revaluate their methods of teaching and made them focus on the core elements of their curricula. Revaluating the methodology has been expected and experienced positive consequence of remote teaching. Following these conclusions, findings from this study empirically support the notion of other researchers and their recent publications (e.g. Flores 2020; Hadar et al. 2020), suggesting that the Covid-19 Pandemic caused many teachers and educators to rethink and reshape their educational practice. However, longitudinal research should be initiated to verify to what extent educational organisations formulate educational policy to professionalise their teachers adopting online teaching methods from a sustainable perspective.

Concerning the third research question, findings of this study demonstrate that educators have the intention to integrate technology in their teaching significantly more, once teaching is back to normal. The main purposes that they want to support with technology are giving instruction, giving feedback, (formative) testing, active

learning, and collaborative learning. They motivated this by claiming that the use of technology in teaching increased efficiency, can lead to more differentiation and personalised education, and because students' motivation increased. Previous studies in the field of teacher education support these findings, show that the use of technology in educational practice could foster differentiation (e.g. Hoepfl 2007), students' motivation (e.g. Higgins et al. 2019) and efficiency (e.g. Sosin et al. 2004). Further, Amhag, Hellström, and Stigmar (2019) claim that teachers' willingness to adopt technology in their lessons is dependent of the experienced and perceived added value, which is in line with the outcomes of this study.

Regarding quality criteria of this study, aspects of reliability and validity are essential to discuss. As described in the method section, both the internal reliability as well as the interrater reliability revealed acceptable scores. Although reliability was guaranteed by using the same participants in the pre and post-tests, the manner of distribution is considered as a limitation. The surveys were posted on LinkedIn, which only reached educators who are active on social media. This may have affected the outcomes of this research, causing a positive bias towards technology.

One of the strengths of this study is the ecological validity, because the crisis situation and its consequential transition to remote teaching was not simulated, but a global urgency. Further, the internal validity was ensured because the pre-test survey was distributed prior to online teaching. However, the internal validity concerning the study's procedure could have been higher if the pre-test survey had been posted before the crisis. Apart from that, the external validity was increased by involving all sectors in education but was limited because the data was only collected from Dutch educators. In order to ensure content validity of the instruments, a panel of experts in the field of educational research were consulted. Additionally, face validity was guaranteed by asking educators to evaluate the surveys regarding alignment with the research questions.

Although several aspects of reliability and validity are ensured and discussed in this paper, it is essential to emphasise that this study was conducted in a critical situation with limited time and high workload for the teachers. Taking this context into consideration, we used a short survey for the teachers counting for their limited time. This puts some limitations on this study. Although several demographic characteristics were adopted as control variables in our statistical analyses, we concluded that more data regarding participants' background could have provided more insights into correlations of the data. In order to strengthen the generalisation of the findings, we suggest including more factors relating to both teachers' traits (such as age) as well as prior competence (such as years of teaching) in empirical follow-up studies (e.g. Cheng and Xie 2018; Ghaith and Shaaban 1999; Kyndt et al. 2016).

It can be concluded that the urgency to teach online created teachers' intentions to use more technology in their lessons, also after the pandemic. This was despite the absence of professionalisation programmes supporting remote teaching. However, this effect might not last, unless teachers are supported to continuously develop and learn. Research has shown that the integration of technology-supported teaching in teacher training programmes has a positive effect on future teachers' use of technology in their teaching (Goos 2011). Therefore, we support claims previously made by other authors that the use of technology should be integrated in teacher training programmes. Results from this study show that the focus as regards to the integration of technology in teacher

training programmes should be on facilitating interaction, monitoring students, and the difference in methodology and pedagogy between online and offline teaching. Apart from that, the added value of the use of ICT, such as flexibility, time efficiency, differentiation, and the opportunity to monitor students' learning processes online, should be incorporated in the teaching training programmes. Lastly, based on the outcomes of this study, teaching training programmes should include (formative) testing and implementation and activation of feedback processes so that teachers would be able to apply these active pedagogical methods in their online teaching.

Besides characterising these teaching training programmes in terms of essential learning environment characteristics, other insights of this study could optimise the design of these programmes regarding group composition and form of the training. The outcomes of this study showed that there were no differences in the online teaching expectations and experiences of teachers among various education sectors. Such lack of differences among the sectors could be an opportunity for collaboration and interaction across different sectors. A primary school teacher might require some basic knowledge and competences with regard to online/blended learning which might be similar to teachers in secondary and/or higher education. For example, joint teaching training programmes can target teachers in both primary, secondary, and higher education. Of course, such programmes could be adjusted to the level of experience with ICT and expected value. Other crucial aspects for educational designers concern the form and the manner in which the training programmes should be provided. As previously addressed, varying perceptions amongst teachers with regard to the adoption of technology in education, due to differences in gender and prior experiences, encourage the notion to develop more personalised and flexible training programmes that meet the needs and preferences of the learning teacher.

Future research should focus on constructing and testing crucial educational design principles for effective professionalisation of teachers in adopting technology within their educational practice. Apart from that, the integration of teaching with use of technology in teacher education curricula should be explored further, as has been recommended by many researchers (e.g. Baran 2014; Koehler, Mishra, and Cain 2013; Maksimovic and Dimic 2016; Tømte et al. 2015).

Disclosure statement

Notes on contributors

Irene van der Spoel is a Lecturer and Innovator at the University of Applied Sciences Utrecht, the Netherlands. Her research interests include Technology-Enhanced Learning, Teacher Professionalisation, Personalised Learning, Modern Foreign Language Methodology, and Formative Assessment.

Omid Noroozi is an Associate Professor at the Education and Learning Sciences Chair Group, Wageningen University and Research, The Netherlands. His research interests include Peer Feedback, Collaborative Learning, E-Learning and Distance Education, Computer-Supported

Collaborative Learning (CSCL), Argumentative Knowledge Construction in CSCL, Argumentation-Based CSCL, CSCL Scripts and Transactivity.

Ellen Schuurink is a Cognitive Psychologist and Chief Product Owner of the Virtual Learning and Research Environment at the University of Applied Sciences Utrecht. Her research interests include technology-Enhanced Learning, Formative Assessment, and Teacher Professionalisation.

Dr. Stan van Ginkel is an Associate Professor of Educational Technology at the University of Applied Sciences Utrecht in The Netherlands. His research interests include Formative Assessment, Academic Skills, Virtual Reality and Curriculum Development.

ORCID

Omid Noroozi http://orcid.org/0000-0002-0622-289X

References

Al-bataineh, A., S. Anderson, C. Toledo, and S. Wellinski. 2008. "A Study of Technology Integration in the Classroom." *Int'l Journal of Instructional Media* 35: 381–387. https://www.learntechlib.org/p/111900/

Albugami, S., and V. Ahmed. 2015. "Success Factors for ICT Implementation in Saudi Secondary Schools: From the Perspective of ICT Directors, Head Teachers, Teachers and Students." *International Journal of Education and Development Using Information and Communication Technology* 11 (1): 36–54. https://www.learntechlib.org/p/151051/

Almekhlafi, A. G., and F. A. Almeqdadi. 2010. "Teachers' Perceptions of Technology Integration in the United Arab Emirates School Classrooms." *Educational Technology and Society* 12: 165–175.

Amhag, L., L. Hellström, and M. Stigmar. 2019. "Teacher Educators' Use of Digital Tools and Needs for Digital Competence in Higher Education." *Journal of Digital Learning in Teacher Education* 35 (4): 203–220. doi:10.1080/21532974.2019.1646169.

Angeli, C., and N. Valanides. 2009. "Epistemological and Methodological Issues for the Conceptualization, Development and Assessment of ICT–TPCK: Advances in Technological Pedagogical Content Knowledge (TPCK)." *Computers & Education* 52: 154–168. doi:10.1016/j.compedu.2008.07.006.

Aslan, A., and Z. Chang. 2015. "Pre-Service Teachers' Perceptions of ICT Integration in Teacher Education in Turkey." *Turkish Online Journal of Educational Technology* 14 (3): 97–110. https://eric.ed.gov/?id=EJ1067711

Baran, E. 2014. "A Review of Research on Mobile Learning in Teacher Education." *Journal of Educational Technology & Society* 17 (4): 17–32. https://www.jstor.org/stable/pdf/jeductechsoci.17.4.17.pdf?seq=1

Bidjerano, T. 2005. "Gender Differences in Self-Regulated Learning." *Online Submission* 1–8.

Biggs, J. B. 1996. "Enhancing Teaching through Constructive Alignment." *Higher Education* 32 (3): 347–364. https://link.springer.com/article/10.1007/BF00138871

Blignaut, A. S., and C. J. Els. 2010. "Comperacy Assessment of Postgraduate Students' Readiness for Higher Education." *The Internet and Higher Education* 13 (3): 101–107. doi:10.1016/j.iheduc.2010.02.007.

Bruce, B. C., and M. C. Hogan. 1998. "The Disappearance of Technology: Toward an Ecological Model of Literacy." In *Handbook of Literacy and Technology: Transformations in a Post-typographic World*, edited by D. Reinking, M. McKenna, L. Labbo, and R. Kieffer, 269–281. Hillsdale, NJ: Erlbaum.

Bryman, A. 2016. *Social Research Methods*. Oxford: University Press.

Cheng, S. L., and K. Xie. 2018. "The Relation among Teacher Value Beliefs, Personal Characteristics, and TPACK in Intervention and Non-intervention Settings." *Teaching and Teacher Education* 74: 98–113.

Chinyamurindi, W., and H. Shava. 2015. "An Investigation into E-learning Acceptance and Gender Amongst Final Year Students." *South African Journal of Information Management* 17 (1): 1–9. doi:10.4102/sajim.v17i1.635.

Clark, R., and D. Feldon. 2014. "Ten Common but Questionable Principles of Multimedia Learning." In *The Cambridge Handbook of Multimedia Learning*, edited by R. Mayer, 151–173. Cambridge: Cambridge University Press.

Compeau, D. R., and C. A. Higgins. 1995. "Computer Self-efficacy: Development of a Measure and Initial Test." *MISQuarterly* 19 (2): 189–211. doi:10.2307/249688.

Coyle, Y., L. Yanez, and M. Verdu. 2010. "The Impact of the Interactive Whiteboard on the Teacher and Children's Language Use in an ESL Immersion Classroom." *System* 38: 614–625. doi:10.1016/j.system.2010.10.002.

Ertmer, P., and A. T. Ottenbreit–Leftwich. 2010. "Teacher Technology Change: How Knowledge, Confidence, Beliefs and Culture Intersect." *Journal of Research on Technology in Education* 42 (3): 255–284. doi:10.1080/15391523.2010.10782551.

Flores, M. A. 2020. "Preparing Teachers to Teach in Complex Settings: Opportunities for Professional Learning and Development." *European Journal of Teacher Education* 43 (3): 297–300. doi:10.1080/02619768.2020.1771895.

Forbes, D., and E. Khoo. 2015. "Voice over Distance: A Case of Podcasting for Learning in Online Teacher Education." *Distance Education* 36 (3): 335–350. doi:10.1080/01587919.2015.1084074.

Ghaith, G., and K. Shabaan. 1999. "The Relationship between Perceptions of Teaching Concerns, Teacher Efficacy, and Selected Teacher Characteristics." *Teaching and Teacher Education* 15 (5): 487–496.

Goos, M. 2011. "Technology Integration in Secondary Mathematics: Enhancing the Professionalisation of Prospective Teachers." In *Constructing Knowledge for Teaching Secondary Mathematics*, edited by P. Sullivan and O. Zaslavsky, 209–225. Boston, MA: Springer.

Gu, L., J. Jiao, X. Wang, Y. Jia, D. Qin, and J. O. Lindberg. 2012. "Case Studies on the Use of Technology in TPD (Teacher Professional Development)." *US-China Education Review* A3: 278–290. https://files.eric.ed.gov/fulltext/ED532919.pdf

Hadar, L. L., O. Ergas, B. Alpert, and T. Ariav. 2020. "Rethinking Teacher Education in a VUCA World: Student Teachers' Social-emotional Competencies during the Covid-19 Crisis." *European Journal of Teacher Education* 1–14. doi:10.1080/02619768.2020.1807513.

Halasa, S., N. Abusalim, M. Rayyan, R. E. Constantino, O. Nassar, H. Amre, M. Sharab, and I. Qadri. 2020. "Comparing Student Achievement in Traditional Learning with a Combination of Blended and Flipped Learning." *Nursing Open* 7 (4): 1129–1138. doi:10.1002/nop2.492.

Higgins, Kristina, Jacqueline Huscroft-D'Angelo, and Lindy Crawford. "Effects of technology in mathematics on achievement, motivation, and attitude: A meta-analysis." *Journal of Educational Computing Research* 57, no. 2 (2019): 283-319

Hoepfl, M. "Differentiation in the technology education classroom." In Analyzing best practices in technology Education, pp. 235–245. Brill Sense, 2007.

Huygen, M. 2017. "Education Should Incorporate the Advantages of ICT." *NRC*, May 8. https://www.nrc.nl/nieuws/2017/05/08/onderwijs-moet-de-voordelen-van-ict-gebruiken-8730396-a1557804

ISTE. 2016. "National Educational Technology Standards for Students (NETS-S)." *ISTE*, May 8. https://www.iste.org/standards/standards/for-students-2016#startstandards

Koehler, M. J., P. Mishra, and W. Cain. 2013. "What Is Technological Pedagogical Content Knowledge (TPACK)?" *Journal of Education* 193 (3): 13–19. doi:10.1177/002205741319300303.

Kuo, Y. C., A. E. Walker, K. E. Schroder, and B. R. Belland. 2014. "Interaction, Internet Self-efficacy, and Self-regulated Learning as Predictors of Student Satisfaction in Online Education Courses." *The Internet and Higher Education* 20: 35–50.

Kyndt, E., D. Gijbels, L. Grosemans, and V. Donche. 2016. "Teachers' Everyday Professional Development: Mapping Informal Learning Activities, Antecedents, and Learning Outcomes." *Review of Educational Research* 86 (4): 1111–1150.

Lakkala, M., and L. Ilomäki. 2015. "A Case Study of Developing ICT-supported Pedagogy through A Collegial Practice Transfer Process." *Computers & Education* 90: 1–12. doi:10.1016/j.compedu.2015.09.001.

Louws, M. L., K. van Veen, J. A. Meirink, and J. H. van Driel. 2017. "Teachers' Professional Learning Goals in Relation to Teaching Experience." *European Journal of Teacher Education* 40 (4): 487–504. doi:10.1080/02619768.2017.1342241.

Maksimovic, J., and C. N. Dimi. 2016. "Digital Technology and Teachers' Competence for Its Application in the Classroom." *Istrazivanja U Pedagogiji* 6 (2): 59–71.

McInnerney, J. M., and T. A. Roberts. 2004. "Online Learning: Social Interaction and the Creation of a Sense of Community." *Journal of Educational Technology & Society* 7 (3): 73–81.

Mulder, M. 2014. "Conceptions of Professional Competence." In *International Handbook on Research into Professional and Practice-based Learning*, edited by S. Billett, C. Harteis, and H. Gruber, 107–137. Dordrecht: Springer.

Noroozi, O. 2018. "Considering Students' Epistemic Beliefs to Facilitate Their Argumentative Discourse and Attitudinal Change with a Digital Dialogue Game." *Innovations in Education and Teaching International* 55 (3): 357–365. doi:10.1080/14703297.2016.1208112.

Noroozi, O., J. Hatami, A. Bayat, S. van Ginkel, H. J. Biemans, and M. Mulder. 2018. "Students' Online Argumentative Peer Feedback, Essay Writing, and Content Learning: Does Gender Matter?" *Interactive Learning Environments* 1–15. doi:10.1080/10494820.2018.1543200.

Ottenbreit-Leftwich, A. T. K. D., T. J. Glazewski, Newby, and P. A. Ertmer. 2010. "Teacher Value Beliefs Associated with Using Technology: Addressing Professional and Student Needs." *Computers & Education* 55 (3): 1321–1335. doi:10.1016/j.compedu.2010.06.002.

Rijksoverheid. 2019."Digitalisation in Education." *Rijksoverheid*, May 6. https://www.rijksoverheid.nl/onderwerpen/toekomst-onderwijs/digitalisering-in-het-onderwijs

Romeo, G., M. Lloyd, and T. Downes. 2012. "Teaching Teachers for the Future (TTF): Building the ICT in Education Capacity of the Next Generation of Teachers in Australia." *Australasian Journal of Educational Technology* 28 (6): 949–964. doi:10.14742/ajet.804.

So, H. J., H. Choi, W. Y. Lim, and Y. Xiong. 2012. "Little Experience with ICT: Are They Really the Net Generation Student-teachers?" *Computers & Education* 59 (4): 1234–1245.

Sosin, K., B. J. Lecha, R. Agarwal, R. L. Bartlett, and J. I. Daniel. 2004. "Efficiency in the Use of Technology in Economic Education: Some Preliminary Results." *American Economic Review* 94 (2): 253–258.

Tallent-Runnels, M. K., J. A. Thomas, W. Y. Lan, S. Cooper, T. C. Ahern, S. M. Shaw, and X. Liu. 2006. "Teaching Courses Online: A Review of the Research." *Review of Educational Research* 76 (1): 93–135. doi:10.3102/00346543076001093.

Tiba, C., J. Condy, and N. Junjera. 2016. "Re-examining Factors Influencing Teachers' Adoption and Use of Technology as a Pedagogical Tool." *South African International Conference on Educational Technologies* 24 (26): 1–11.

Tømte, C., A. B. Enochsson, U. Buskqvist, and A. Kårstein. 2015. "Educating Online Student Teachers to Master Professional Digital Competence: The TPACK-framework Goes Online." *Computers & Education* 84: 26–35. doi:10.1016/j.compedu.2015.01.00.

Turel, V. 2014. "Teachers' Computer Self-efficacy and Their Use of Educational Technology." *Turkish Online Journal of Distance Education (Tojde)* 15 (4): 130–149. https://eric.ed.gov/?id=EJ1044190

U.S. Department of Education, Office of Educational Technology. 2017. "Reimagining the Role of Technology in Education: 2017 National Education Technology Plan Update." *U.S. Department of Education*, May 8. https://tech.ed.gov/files/2017/01/NETP17.pdf

Ungar, O. A., and A. F. Baruch. 2016. "Perceptions of Teacher Educators regarding ICT Implementation." *Interdisciplinary Journal of e-Skills and Lifelong Learning* 12: 279–296. http://www.ijello.org/Volume12/IJELLv12p279-296Ungar2793.pdf

Van Ginkel, S., D. Ruiz, A. Mononen, C. Karaman, A. de Keijzer, and J. Sitthiworachart. 2020. "The Impact of Computer-mediated Immediate Feedback on Developing Oral Presentation Skills: An Exploratory Study in Virtual Reality." *Journal of Computer Assisted Learning* 36 (3): 412–422. doi:10.1111/jcal.12424.

Van Ginkel, S., J. Gulikers, H. Biemans, O. Noroozi, M. Roozen, T. Bos, T., . R. Van Tilborg, M. Van Halteren, and M. Mulder. 2019. "Fostering Oral Presentation Competence through a Virtual Reality-based Task for Delivering Feedback." *Computers & Education* 134: 78–97. doi:10.1016/j.compedu.2019.02.006.

Venkatesh, V., and F. D. Davis. 2000. "A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies." *Management Science* 46 (2): 186–204. doi:10.1287/mnsc.46.2.186.11926.

Wong, L.-H., C. S. Chai, G. P. Aw, and R. B. King. 2015. "Enculturating Seamless Language Learning through Artefact Creation and Social Interaction Process." *Interactive Learning Environments* 23 (2): 130–157. doi:10.1080/10494820.2015.1016534.

Yuen, Allan HK, and Will WK Ma. "Gender differences in teacher computer acceptance." *Journal of technology and Teacher Education* 10, no. 3 (2002): 365–382.

Yukselturk, E., and S. Bulut. 2007. "Predictors for Student Success in an Online Course." *Journal of Educational Technology & Society* 10 (2): 71–83.

Yukselturk, E., and S. Bulut. 2009. "Gender Differences in Self-regulated Online Learning Environment." *Journal of Educational Technology & Society* 12 (3): 12–22.