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Teacher educators' perceptions of working with digital technologies

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ABSTRACT

This article is part of a research project aimed to broaden the understanding of the established gap between policies regarding the use of digital technology and the actual use of digital technology in Norway. To understand this gap we have conducted a comparative study between teacher education in Norway and teacher education in New Zealand, two countries with quite different approaches to implementing digital technology in education. We found several interesting differences between the countries. The regression analysis and the correlation analysis show that the professional use of digital tools correlates with the teacher educators' level of digital competence in New Zealand. On the other hand, in Norway the professional use of digital tools correlates stronger with teacher educators' attitudes towards digital technology in education. Attitudes has a stronger influence (impact) than digital competence regarding to what extent digital tools are being used in Norway, and digital competence has a stronger influence than attitudes regarding to what extent digital tools are being used in New Zealand.

INTRODUCTION

A common assumption across the globe is that initial teacher education should reflect developments in their field of practice. Consequently, digital literacy should be clearly highlighted in the initial teacher education curriculum, as we are becoming a world of digitally rich environments, which includes classroom practice (Somekh, 2007). Teacher education has a double role in digitally rich classrooms. Engen, Giæver, and Mifsud (2015) describe how it develops both student teachers' professional skills and their expertise in

facilitating pupils' learning. A teacher educator who uses ICT for the enhancement of the learning process of his students also shows students at the same time how ICT can be used in primary education (Drent & Meelissen, 2008). Constructing high-quality teacher education is therefore, according to Engen et al. (2015), multifaceted, requiring consideration of schools' and pupils' needs, and the current curricula, in order to prepare students for future teaching positions.

To reflect these societal and educational expectations, both the Norwegian and New Zealand curricula for schools assert that digital literacy is important for students' learning (Ministry of Education and Research [MER], 2016b; Ministry of Education [MoE], 2007). Nevertheless, the implementation of digital literacy in education has been carried out quite different in the Norwegian and New Zealand education systems. Whereas the New Zealand strategy has been suggestive, the Norwegian strategy has been mandatory. In Norway, the ability to make use of information and communication technology has been added as a fifth fundamental skill in all school subjects at all levels (MER, 2006, 2016a). Digital skills has a status equal to oral skills, reading, writing and numeracy (MER, 2016b). The New Zealand curriculum for schools (years 1–13) resembles the Norwegian curriculum and is based on five key competencies: thinking; using language, symbols and texts; managing self; relating to others; participating and contributing (MoE, 2007). Digital competence is not a key competence in itself, but it is listed in relation to the 'use of language, symbols and texts' (MoE, 2007). This key competency is described as the confident use of Information and Communication Technology (ICT) to access and provide information and to communicate with others (MoE, 2007). One difference between Norway and New Zealand is that while Norway has had a massive top-down implementation of digital technology, in every subject at all levels in schools, the New Zealand strategy has, to a greater degree, been implemented from the bottom up. Norway is, according to Krumsvik (2014), exposed to a stronger educational top-down implementation of ICT in pedagogy and other subjects than other countries. Despite the political focus on digital technology in education, it seems that practitioners in the Norwegian education system are not working in line with the policy (Egeberg et al., 2012; Egeberg, Hultin, & Berge, 2016; Hatlevik, Egeberg, Gudmundsdóttir, Loftsgarden, & Loi, 2013; Norgesuniversitetet, 2015; Wilhelmsen, Ørnes, Kristiansen, & Breivik, 2009; Ørnes, Wilhelmsen, Breivik, & Solstad, 2011). There appears to be a gap between what is stated in the curriculum and what practitioners are doing. A gap that is often explained by practitioners deficiency and/or lack of interest (Arbelaiz & Gorospe, 2009; Egeberg et al., 2012; Egeberg et al., 2016; Enochsson & Rizza, 2009; Gouseti, 2010; Hatlevik et al., 2013; Player-Koro, 2013).

The pervasive change in the Norwegian school curriculum has consequently resulted in changes in initial teacher education in Norway. With regard to Norwegian initial teacher education, White Paper No. 11 (MER, 2008) has emphasised digital competence as one of the basic competencies that teacher educators and student teachers are required to focus on during their initial teacher education. This change in both school curriculum and in the general plan for initial teacher education in Norway has in effect changed the underlying premise for teaching and learning in Norwegian initial teacher education programmes (Krumsvik, 2014). This paper will examine the impact of such a pervasive strategy, by presenting a comparative study of teacher educators at a Norwegian university (University of

Tromsø, UiT) and teacher educators at a New Zealand university (University of Waikato, UoW).

Even though New Zealand has not gone through a reform like this, both universities express an awareness regarding the impact of digital development on education and the need to prepare their beginning teachers for their future careers. This is reflected in each universities' description of their initial teacher education programmes. For example, on completion of the degree of Bachelor of Teaching at the University of Waikato, the intention is that the student will understand the 'technological contexts of education and their impacts on educational practice' (UoW, 2016b). Likewise, UiT states that when training is complete, the student will have learned how to use digital tools in educational contexts (UiT, 2016a, 2016b). In general, both universities have a focus on digital literacy and supporting staff in developing skills in it. This is illustrated by the department of teacher education at UiT defining 2014/2015 as 'the digital year'. During this period, the department had a special focus on evolving the staff's digital literacy. At UiT there is a resource centre for teaching, learning and technology (Result) which is tasked with supporting staff in their use of digital tools and resources when teaching (UiT, 2017). The University of Waikato has a project called 'Digital literacy @ Waikato': this project also supports ongoing development and improvement of practice concerning ICT. The importance of digital tools is also recognisable in the philosophy of the Waikato Centre for eLearning at the University of Waikato in New Zealand (WCEL). This centre is a central unit dedicated to the support of staff in all faculties and divisions at the University of Waikato and actively promotes the use of effective technologies in teaching, learning, research and administration (UoW, 2016a). According to WCEL, one will not be able to live, learn, work or participate fully in today's digital society without digital literacy. WCEL also claims, in accordance with Norwegian educational reform, that 'digital literacy is as important as reading and writing' (UoW, 2012).

In spite of many similarities between the two countries, we find potential differences more interesting, as knowledge and understanding regarding the differences could broaden the understanding of the challenges experienced in Norway. We have therefore developed this research question.

Research question:

What differences are found, regarding teacher educators' attitudes towards and the use of digital technology in education, between Norway and New Zealand?

THEORETICAL FRAMEWORK: THEORY OF ACTION

As the aim of this research was to understand in what ways the use of digital technologies in education may affect teacher educators and their understanding of their own practice, the practitioner's point of view was essential. Therefore, a questionnaire was developed for teacher educators at the University of Waikato (UOW), New Zealand, and for teacher educators at the Arctic University of Norway (UiT), Tromsø, Norway. The questionnaire was based on the 'Theory of Action' by Argyris and Schön (1978), an approach that begins with

a conception of human beings as designers of action (Argyris, 1992). Theory of action is a theoretical framework that offers an analytical distinction between 'espoused theory' and 'theory in use'. 'Espoused theory' is defined by Argyris and Schön (1996) as being the theory of action which is advanced to explain or justify a given pattern of activity. In other words, espoused theory can be understood as the individual's or the organisation's attitudes toward practices. 'Theory in use' is described as the theory of action which is implicit in the performance of that pattern of activity, in other words actions in practice (Argyris & Schön, 1996). This theoretical framework is a structure that can help to describe and comprehend why policy intentions regarding the use of digital technologies are not leading to actions in practice. As described by Argyris and Schön (1996, p. 14) 'organisational theory-in-use may be tacit rather than explicit and tacit theories-in-use may not match the organization's espoused theory'. An organisation's formal documents, such as policy statements or job descriptions, will often contain espoused theories of action incongruent with the organisation's actual pattern of activity (Argyris & Schön, 1996). According to Argyris (1992, p. 216), 'theories of action determine all deliberate human behaviour'.

Theory in use

To gain insight into the respondents' theories in use (Argyris & Schön, 1978), teacher educators at both universities were asked about the extent of their use of different digital technologies when teaching. A theoretical approach was also applied to construct statements for the questionnaire based on the term 'digital competence'. The term 'digital competence' was operationalised by using definitions by Tømte and Olsen (2013) and Lund, Furberg, Bakken, and Engelien (2014). In accordance with the definition, the focus was on three defined aspects of digital competence: pedagogic and didactic understanding, subject-specific understanding, and technological understanding. This definition of digital competence was chosen because recent literature is generally in agreement regarding this categorical understanding of digital competence (Lund et al., 2014; Tømte & Olsen, 2013).

Espoused theory

To gain understanding of teacher educators attitudes (their espoused theories), statements were prepared, based on the OECD report 'Connected Minds: Technology and Today's Learners' (2012) and its description of the field's existing attitudes towards technology. In the report, the field is characterised by a continuum, from being technology averse to being technology positive. To include this span of attitudes, statements were prepared to identify the respondents' own motivations for using digital tools, the respondents' attitudes towards digital tools' position in the public arena, and their attitudes towards the use of digital tools in teaching.

This resulted in a quantitative design that contains three overall variables: the extent of use of digital tools, the level of digital competence, and the attitudes towards digital tools in an educational context.

Digital skills, digital competence and digital literacy.

Comparing the two countries' descriptions of what is seen as fundamental for learning and developing, a theoretical and terminological challenge emerges. In Norway, the focus is on skills, and in New Zealand the focus is on competencies.

New Zealand key competencies (MoE, 2007, p. 12)	**Norwegian fundamental skills (DE, 2006)**
– Thinking. – Using language, symbols and texts. – Managing self. – Relating to others. – Participating and contributing.	– Oral skills – Reading – Writing – Digital skills – Numeracy

This is an interesting difference in perspectives, but also a difference that needs to be addressed. Ferrari (2012, p. 30) has defined digital competence as 'a set of knowledge, skills, attitudes, abilities, strategies and awareness that are required when using ICT and digital media'. In other words, digital competence is a broader definition and involves far more than technical skills (Instefjord & Munthe, 2015). Norway has based their curriculum on a narrower understanding of learning, while New Zealand focus on competencies. As Engen et al. (2015) write, the term 'skills' can indicate a limited understanding of digital competence. Nevertheless, the framework for the Norwegian basic skills define 'digital skills' quite broadly. Therefore it is crucial to understand the concepts underpinning 'digital skills' as the term is used in the curriculum, 'digital skills' which include both tool competences and critical competences. It is therefore difficult to compare the lists, as they present two different levels of understanding learning, a competence level and a skill level. Even though the levels are overlapping., It is also important to bear in mind that the New Zealand key competencies and the Norwegian fundamental skills are only sections extracted from a bigger more complex picture. They do not represent the curriculum as a whole. Nevertheless, they pose as an example of a difference between the two countries' educational focuses.

'Digital literacy' is also a term used in this article, as there are many overlapping and complex terms in this field of research (Beck & Øgrim, 2009; Instefjord & Munthe, 2015; Thorvaldsen, Egeberg, Pettersen, & Vavik, 2011). It is hard to translate 'literacy' to Norwegian, as there is a lack of precise translation. The surveys are therefore based on the term 'digital competence' (digital kompetanse), to secure the comparative element in the study. There has also been an increased use of the term digital competence in political documents in Europe (Engen et al., 2015, p. 74), which has been described as an established theoretical platform to build upon (Lund et al., 2014; Tømte & Olsen, 2013).

METHOD AND DESIGN

This study involved academic staff who are teacher educators teaching in a range of initial teacher education programmes at the Arctic University of Norway (UiT) and at the University of Waikato (UoW), New Zealand. The data was collected using an online questionnaire sent by email to teacher educators at the two universities.

Presentation of the participants

Despite being on opposite sides of the globe, Norway and New Zealand are facing many of the same challenges in education policy. Both Norway and New Zealand must educate student teachers in digital-rich environments, as both countries are teaching students who have high access to various ICT and educational resources at home (OECD, 2010, p. 95). This access is indicated in the table below.

Table 1 OECD (2010, p. 95)

Percentage of students having access to various ICT and educational resources (OECD, 2010).			
	A computer to use for schoolwork	**Educational software**	**Calculator**
New Zealand	87	58	96
Norway	94	58	97
OECD average	79	43	92

This is reflected in the two countries' policies, as both countries include digital technology as a foundation for learning. The University of Waikato is similar to the Arctic University of Norway in student number size (UoW 12,000 students; UiT15,800 students). They are both universities with a strong bicultural component, as they both are universities with a focus on indigenous culture and people. Furthermore, both universities value international collaborations and have a multicultural student population.

SAMPLING PROCEDURES

The study was carried out digitally using Questback, which is a commercial tool developed for use in a wide range of investigations. In Norway, the sample was collected in the first half of 2015, and in New Zealand in early 2016. Sixty-seven of the eighty teacher educators from UiT responded to the survey, which is a response rate of 83.75%. At UoW, forty-seven of sixty-four invited to participate in the study responded to the survey, which is a response rate of 73.44%.

ETHICS

The study as a whole was approved by NSD (the Norwegian Centre for Research Data). The New Zealand part of the study was in addition approved by the University of Waikato Research Ethics Committee at the Faculty of Education.

MEASURES

Data was collected from teachers' self-reports on five point Likert-type questionnaire items (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree), or (1 = never, 2 = rarely, 3 = occasionally, 4 = often, 5 = extensively). Thematically, the questionnaire had thirty-eight items. Some of the items were collapsed into three multi-item constructs, while

others remained as single items. Some items had a reversed scale, denoted by REV. The survey involves three main constructs: Digital Competence, Professional attitude and Professional applications of tools. While the two constructs of Digital Competence and professional attitude were based on Likert-scaled statements, the professional application of tools were based on the reported frequency of use of sixteen digital technologies and work methods of the participants in their own teaching in the past year. The constructs were each based on questionnaire items as follows:

Digital Competence:

- I am familiar with digital tools that can help diverse teaching.
- I am, in general, confident when using digital tools.
- I find it easy to become familiar with new digital tools.
- I can use digital tools which are appropriate for the aspects of the subjects I am teaching.
- It is difficult to use digital tools as an educational resource within my subject. REV.

Professional attitude:

- When I use digital tools in my teaching, I find it adds value.
- The use of digital tools is essential for good teaching.
- Society's expectations of the impact of digital tools is exaggerated. REV.
- Expectations related to the use of digital tools in teaching frustrates me. REV.
- In academic debates at our university, the expectations of the impact of digital tools are exaggerated. REV.

Professional application of tools:

- Digital tools for testing with Multiple Choice Questions
- Moodle or Fronter (Each university's learning management system)
- Digital tools for presentation (like Powerpoint or Prezi)
- Word processor
- Spreadsheets (like Excel)
- Use of Video
- Production of film/video/animation
- Online discussions
- Online meetings (like Lync, Adobe Connect or Skype)
- Production of Wiki (website which allows collaborative modification)
- Screen capture (like Camtasia or Mediasite)
- Programs for scientific analyses
- Student response systems (online questions answered by phone or computers, like Kahoot or Socrative)
- Tools for collaborative writing (like Google docs)
- Social media (like Facebook or Twitter)
- The Internet as a source of knowledge

ANALYSIS

Internal consistency should be determined before the data can be employed for research (Tavakol & Dennick, 2011). We computed Cronbach's alpha for all constructs as a measure of internal consistency and analysis of reliability. The Cronbach's alpha measures yielded a value of alpha of 0.81 for digital competence, 0.71 for professional Attitude, and 0.79 for professional Application of tools. This described the extent to which all the items in the construct measured the same concept. The acceptable values of alpha range from 0.70 to 0.95. Due to the fact that too high alpha may suggest that some items are redundant as they are testing the same questions but in a different guise, a maximum alpha value of 0.90 is recommended (Tavakol & Dennick, 2011). This evaluation of reliability of data and internal consistency in the three constructs created a basis for further analyses. We investigated differences between groups defined by country, gender and age by using the Student's t-test, to determine whether there was a substantial difference between means. The results of the Student's t-test are accounted for when discussing the results. Effect sizes were estimated by Cohen's d-value, with Cohen's conventions: 0.2=small effect, 0.5=medium, and 0.8= large effect (King et al., 2011: 267). This was done to analyse differences of means between the results of the Norwegian and the New Zealand part of the study. We also performed correlation analyses separately for each country, to look for differences between them. Finally, linear regression analysis was carried out with Prof. application of tools as the dependent variable. This model examines whether it is the same variables that contribute to the result within the country, as across countries (as found in the comparison of means). All the analyses were performed using SPSS version 23 (Windows).

RESULTS

When comparing the items in the survey independently, the findings indicated that there are different opinions between Norwegian and New Zealand teacher educators regarding whether or not the use of digital tools is essential to good teaching.

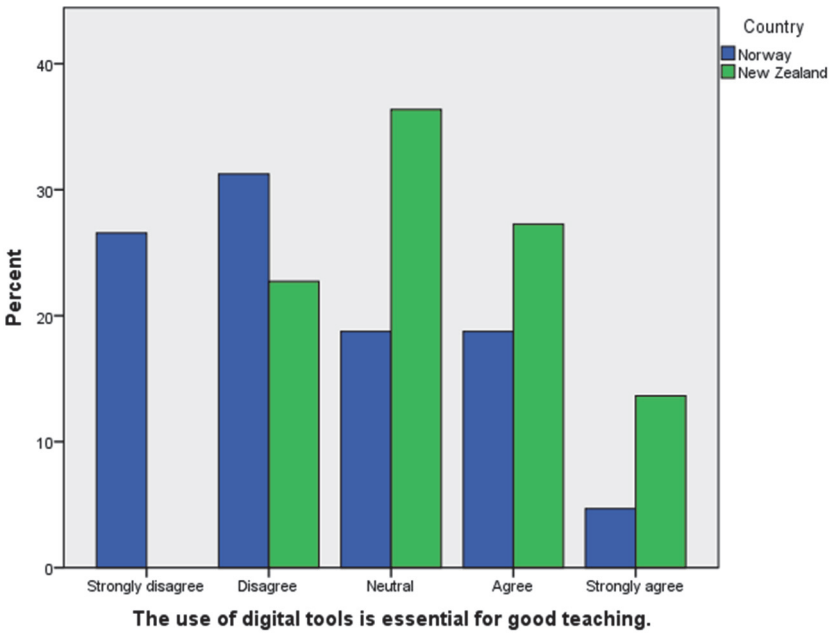

Table 2

The results are varied, but in Norway there was a predominance of disagreement with the statement: 57.8% of the respondents disagreed or strongly disagreed with the notion of the use of digital tools being essential for good teaching, while 23.4% agreed or strongly agreed with this statement. For the New Zealand participants, there was a predominance of agreement with the notion of digital tools being essential for good teaching: 40.9% either agreed or strongly agreed with the statement, while only 22.7% disagreed. Despite the differences in the responses regarding whether teacher educators find the use of digital tools essential for good teaching, when asked if the teacher educators often use digital tools in their own teaching, there was little difference between the universities. The majority of teacher educators at both institutions often use digital tools when teaching, even if the attitudes regarding whether or not it was essential was divided: 79.5% of the New Zealand participants and 70.3% of the Norwegian participants agreed or strongly agreed with using digital tools often in their own teaching. Only 9.1% of the New Zealand participants and 10.9% of the Norwegian participants disagreed or strongly disagreed with the statement. These results illustrate a contrary picture between the two countries regarding teacher educators' attitudes towards digital tools in teaching.

Findings associated with how the teacher educators perceive both the public and professional debate over digital development strengthens the assumption that there is an interesting difference between the countries. When asked about whether they agreed to the statement that society's expectations of the impact of digital tool is exaggerated, the New Zealand and Norwegian teacher educators seem to concur in their responses. Of the Norwegian respondents, only 15.6% disagreed with the statement 'society's expectations of the impact of digital tools are exaggerated', while 57.8% of the respondents agreed or strongly agreed with the statement. Of the New Zealand respondents, 25% disagreed with

society having exaggerated expectations related to digital tools, while 43.2% agreed or strongly agreed with the statement. Therefore, societal expectations are not necessarily expectations perceived by teacher educators. A majority of the teacher educators did not agree with the attitudes in the public domain.

When the participants were asked to agree or disagree with the statement regarding whether or not expectations concerning the impact of digital tools in academic debates at the university are exaggerated, the findings between the two countries were significantly different.

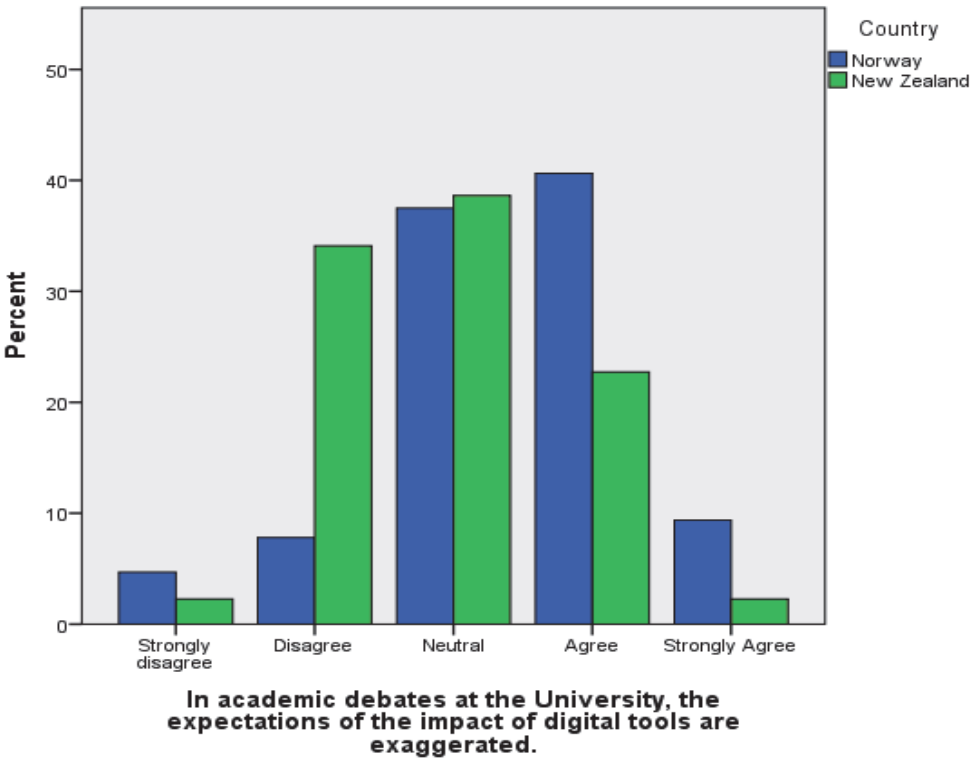

Table 3

Only 12.5% of the Norwegian respondents replied that they disagreed or strongly disagreed with the statement that the academic debates at UiT are characterised by exaggerated expectations of the impact of digital tools. By contrast, 50% of the participants responded that they agreed or strongly agreed with the statement. The New Zealand participants had a predominance of disagreement: 36.3% disagreed or strongly disagreed with the statement, while 25% agreed or strongly agreed. In other words, in the New Zealand part of the study, the participants' understanding of colleagues' attitudes towards digital tools were more in line with the participants' own attitudes. However, in the Norwegian part of the study, the participants did not express confidence towards their colleagues' assessment of digital tools.

When looking at the multi-item construct, the Norwegian teacher educators report higher Digital Competence than New Zealand teacher educators, but a significantly lower Professional Attitude (p-value= 0.042, as shown in Table 4).

Table 4 Self-perceived results from Norway and New Zealand. The table also shows p-values (t-test) and effect size (Cohen's d).

Variable list	Scale	Norway Mean (SD)	New Zealand Mean (SD)	p-value	Effect size
Digital Competence [(c)]	1–5	3.91 (.76)	3.71 (.69)	.16	.28
I am familiar with digital tools that can help diverse teaching.	1,2,3,4,5	4.02 (1.00)	3.89 (.92)	.50	.14
I am, in general, confident when using digital tools.	--- " ---	3.95 (1.02)	3.75 (.92)	.29	.12
I find it easy to become familiar with new digital tools	--- " ---	3.53 (1.13)	3.27 (.97)	.22	.25
I can use digital tools which are appropriate for the aspects of the subjects I am teaching.	--- " ---	3.89 (1.06)	3.82 (.84)	.71	.07
It is difficult to use digital tools as an educational resource within my subject.	--- " ---	1.81 (.97)	2.16 (.78)	.052	–.40
Professional Attitude [(c)]	1–5	3.00 (.73)	3.27 (.62)	.042 *	–.41
When I use digital tools in my teaching, I find it adds value.	1,2,3,4,5	3.88 (.93)	3.91 (.74)	.84	–.03
The use of digital tools is essential for good teaching.	--- " ---	2.44 (1.21)	3.32 (.98)	<.001***	–.80
Society's expectations of the impact of digital tools is exaggerated.	--- " ---	3.53 (1.08)	3.30 (1.05)	.26	.22
Expectations related to the use of digital tools in teaching frustrates me.	--- " ---	2.38 (1.06)	2.68 (.91)	.12	–.30
In academic debates at our university, the expectations of the impact of digital tools are exaggerated.	--- " ---	3.42 (.94)	2.89 (.87)	.003**	.59

N=108.
(c) Constructs combining the single variables below.
* Significant at the 0.05 level (2-tailed).
** Significant at the 0.01 level (2-tailed).
*** Significant at the 0.001 level (2-tailed).

Even though there is a difference between the measured multi-item construct 'professional attitude' between New Zealand and Norway, some tendencies were similar when analysing single items independently.

Table 5 Self-perceived use of digital tools from Norway and New Zealand. The table also shows p-values (t-test) and effect size (Cohen's d).

Variable list	Scale	Norway Mean (SD)	New Zealand Mean (SD)	p-value	Effect size
Prof. Application of tools(c)	1–5	2.59 (.54)	2.99 (.53)	<.001***	–.75
I often use digital tools in my own teaching.	1,2,3,4,5	3.95 (1.09)	4.14 (1.09)	.39	–.17
I mainly use digital tools in my teaching because it is expected by others.	––– " –––	1.88 (1.06)	2.34 (1.08)	.028*	–.43
I have experienced that the use of technology in teaching has been disruptive for the expected outcomes.	––– " –––	2.83 (1.12)	2.52 (.90)	.14	.31

N=108.
(c) Construct combining 16 variables on digital tools/work methods applied in teaching during the past year.
* Significant at the 0.05 level (2-tailed).
*** Significant at the 0.001 level (2-tailed).

Table 5 shows the results for the application of digital tools and work methods in teaching during the past year. The construct Prof. Application of tools consists of sixteen items, and six of the items show a significant higher use (p-value < 0.01) in New Zealand than in Norway (Use of video, Online discussions, Online meetings, Production of Wikis, Collaborative writing like Google docs, and Internet as a source of knowledge). Only one item received a significantly higher score in Norway (Use of Word processor). One explanation for this difference is that the two countries have executed the implementation of digital technology differently. While Norway has had a massive top-down implementation, in every subject at all levels in schools, the New Zealand strategy has to a greater degree been implemented from the bottom up. These are two very different contexts that are likely to affect how great a degree the teacher educators feel they are using digital technology in their teaching.

The correlation analyses conducted for each country (Table 6) reveal interesting differences between them. In New Zealand the Prof. Application of tools variable is strongly correlated with Digital Competence (r=.541), and less with Prof. Attitude (r=.360), but in Norway it is the other way around.

Table 6 Correlations for each country separately

	Digital Competence (c)	Prof. Attitude(c)
Prof. Application of tools(c)	.327 ** (Norway)	**.452** ** (Norway)
	.541 ** (New Zealand)	.360 * (New Zealand)

N=108.
(c) Construct combining single variables.
* Significant at the 0.05 level (2-tailed).
** Significant at the 0.01 level (2-tailed).

Regression analyses carried out separately for each country also reveal an interesting story (Table 7).

Table 7 Regression Analysis to predict Professional Application of Tools

Variable list	Norway		New Zealand	
	Beta (standardized)	p-value	Beta (standardized)	p-value
Digital Competence	.175	.16	.473	.002**
Prof. Attitude	.382	.003**	.171	.23

** Significant at the 0.01 level (2-tailed).

When we try to predict the professional application of digital tools (Prof. Application of tools) in New Zealand, the best predictor is Digital Competence (Beta=.473, p-value = .002), while the best predictor in Norway is Prof. Attitude (Beta=.382, p-value = .003). It appears from this analysis that the influence and contribution of digital practice is carried out quite differently in the two countries. In Norway, the professional use or application of digital tools is dominated by professional attitude, while in New Zealand it is dominated by digital competence. At the same time, the digital competence is somewhat lower in New Zealand than in Norway, but the professional application of digital tools is significantly higher.

Adjusted R-square for the multiple regression model in Table 5 is .205 for the Norwegian model, and .284 for the one from New Zealand, which tells us that 20.5 % and 28.4 %, respectively, of variation in the output variable (Prof. Application of Tools), can be explained by the predictors in the model. To elaborate further on these results, we restricted the data set to the teacher educators working within initial teacher programs for primary or secondary schools (28 in Norway and 24 in New Zealand), and performed the same analyses. The results came out fully consistent with the analysis above (data not shown), so the findings are independent of what programme the teacher educator is teaching. In addition, when we restricted the data to only females, or only males, the results were essentially the same as the general trends in the results presented above. Hence, although the sample was relatively small, the results suggest these differences of perspective about technology may not be explained by gender or by educational tasks alone.

DISCUSSION

The societally-expressed expectations related to digital technology in education are perceived by teacher educators to be exaggerated. A majority of the teacher educators did not agree with the attitudes and perceptions in the public domain. Nevertheless, digital literacy has been incorporated within formal curricula, and curricula can, according to Engen et al. (2015, p. 174) also be described as 'social practices mirroring society's definition of tools that are deemed essential'. But who holds the power to define what is essential? When the Norwegian teacher educators were asked about their attitudes towards digital technology when teaching, the tendency was that it was not considered essential for good teaching. In contrast to this, the Norwegian teacher educators also expressed themselves in the workplace in a manner that made colleagues perceive them as having exaggerated expectations toward digital technology in education. When asked about the extension of use, digital

technology was used fairly often, compared to what to expect based on the espoused theory they expressed. The results therefore indicate that there is a difference between the Norwegian teacher's espoused theory and theory in use concerning digital technology in education. Cris Argyris (1999) writes that the theory of action is based on a notion of human rationality, both in the espoused theory and the theory in use. "This makes understanding rationality more complex, because as we have seen, the rationality embedded in the theories-in-use is often counter to the rationality embedded in the espoused theory" (Cris Argyris, 1999, p. 96). A mismatch between theory in use and espoused theory might not be unique, but this is a difference not evident in the New Zealand part of the study. This poses the question of why this difference exists, and there are many different possible explanations.

Player-Koro (2013, p. 28) writes that 'the failure of ICT integration in education and teacher education is often stated in relation to the optimistic rhetoric that is produced through the official discourse'. Nivala (2009) writes about the ubiquitous globalisation and information society discourse, and expresses a worry regarding the trend of presenting ICT as a 'technical fix' for society and education. He writes that teachers are 'forced' to use ICT whether they find it useful or not. Supranational organisations are, according to Haugsbakk (2013), setting the parameters in particular directions with one important example of this being the PISA tests initiated by the OECD. 'The spirit of the discourse, its economic and technological determinism, leaves no space for a critical and rational approach to ICT or its educational use' (Nivala, 2009, p. 445). If this is the case, the mismatch in the Norwegian responses between theory in use and espoused theory could be understood as attempts to express opposition, as a form of expression of frustration or counter-power by the practitioners. Engen et al. (2015) claim that the double role of teacher education means that the relationship between the curricula for teacher education and for schools is crucial. Still, their findings suggests that there is an obvious disparity between the terms that the curriculum sets for the education of digitally competent pupils and those that the governing documents of teacher education set for the education of digitally competent teachers in Norway. This may add to the complexity of working as a teacher educator, when the formally espoused theory is not aligned in the different curricula for thedifferent levels in the education system. Engen et al. (2015) claim that weak links between the curriculum for schools and official guidelines for teacher education imply that teacher education does not meet the needs of school. But their study does not refer to practices, but rather discusses the premises that formal documents lay out for teacher education. Our finding, when including the practitioners, indicates a bigger picture that implies a critical review of the premises in both the guidelines for teacher education and the curriculum for schools.

Another possibility for explaining the inconsistency in the Norwegian part of the study is that the field of education and digital technology may be governed by ideology. Player-Koro (2013) writes that there has been made a rhetorical redefinition regarding the technological reform in education by powerful agents, such as OECD and EU. She further writes, 'in this rhetoric, there has been a naïve faith in the promises of new technology to enable teachers to make improvement in the content, methods and organisation of teaching and learning' (Player-Koro, 2013, p. 27). One can question whether the stronger ongoing indiscriminate progression towards an increased use of digital tools in Norway is an

explanation for the differences found between the two countries. Elstad (2016) describes how educational technology has been raising false expectations, and the ambitious governmental strategies for implementing ICT in school have been criticised by researchers and school professionals. Another explanation for the conflicting espoused theory and theory in use by the Norwegian participants is tied to how espoused theory and theory in use are expressed at different levels in the workplace. In Norwegian education, specific framework and expectations are developed and communicated regarding the teacher educators' theory in use. The framework for what you are supposed to do in practice is explicit. Jacobsen, Schnack, and Wahlgren (1987) claimed that people often immediately accept proposals if they are described as 'effective', 'appropriate' or 'expedient'. They also found that when ideology governs, there is often little focus on what the goal of the proposal is or what the benefits of the proposal are. The teacher educator's espoused theory is not governed by policy in the same way. Teacher educators might comply with policy at the level of theory in use, even if they do not express this at the level of their espoused theory. Organisational theory in use, on the other hand, may remain tacit because it is not discussable, because any attempt to reveal its incongruity with the organisation's espoused theory would be perceived as threatening or embarrassing (Argyris & Schön, 1996).

It is important to be critical if the field of education is governed by ideology, and according to Jacobsen et al. (1987, p. 51), it requires robustness from those who are critical. If ideology governs how digital technology is being implemented in education, it can become something we uncritically accept as better even if it is not something we have carefully considerered. Critical questions will therefore, according to Jacobsen et al. (1987), often cause irritation among those who support the ideological idea. In such cases, a possible discussion will however often reveal that there is disagreement, but the individuals have not had a real opportunity to comment on the matter (Jacobsen et al., 1987).

An important question that should be further researched is why the Norwegian teacher educator's use of digital technology is correlated and predicted by their attitude, while the New Zealand teacher educator's use of digital technology is correlated and predicted by their level of digital competence. Is this an impact of the different approaches to governing education: top-down or bottom-up? Regarding a mandatory use of technology in teaching, Yeung, Taylor, Hui, Lam-Chiang, and Low (2012) found that compliance with requirements was found to be negatively correlated with digital competence and uncorrelated with frequency of use. These findings can be seen in relation to the correlation between the use of digital tools and attitude in Norway, compared to correlation between the use of digital tools and digital competence in New Zealand. A difference between the two countries is the number of formal requirements for the use of digital technology, and the level of digital competence. As compliance with requirements is found to be negatively correlated with digital competence, it is not surprising that the use of digital tools among Norwegian teacher educatorsis dominated by Professional Attitude, while in New Zealand the use of digital tools is dominated by digital Competence.

The results indicate that mandating use of digital technology may not be useful. In line with these findings, Yang (2012) claims that there are limits to how much progress the top-down approach can achieve towards the transformational effects expected of digital technology. According to Player-Koro (2013), the official techno-positivist pedagogical dis-

course has little in common with what is actually going on in educational practice. If this is so, it would be constructive for the field of practice to expose the reason for the deviation between the Norwegian teacher educators' espoused theory and their theory in use. As Argyris (1992, p. 216) claims, 'To see human behaviour under the aspect of action is to see it as constituted by the meanings and intentions of agents. Agents design actions to achieve intended consequences.' Further research should look into what meanings, intentions and intended consequences affect the mismatch in Norwegian teacher education.

LIMITATIONS

Our present study is based on teacher educators' attitudes regarding what is going on in their professional work regarding the place of digital technology. The research literature points to an often observed inconsistency between teachers' beliefs, expressed in interviews and surveys, and their actual practice in classrooms (Beswick, 2005). On the other hand, some studies also indicate consistency between teacher beliefs and practice (Speer, 2005) – and as proposed by (Speer, 2008), the data collection and analysis methods may lie behind these different findings concerning the relationships between beliefs as represented in surveys, and practice. Comparing attitudes and beliefs can be seen as a conceptual challenge. Attitudes and beliefs are by some seen as equivalent and interchangeable constructs, both conceptually and operationally. Others claim that there are fundamental distinctions between the two terms (Wang, 2010). This article will not include this theoretical discussion, and bases the term 'attitude' on the description in the theoretical section.

Another conceptual challenge emerges when discussing digital technology. Digital technology is a term that can include one-to-many technologies and peer-to-peer technologies, professionally produced and user-generated content. It may include technologies specific to education or those used across formal/informal boundaries. Lastly, it includes both standalone and online networked technologies (Livingstone, 2012). This complex diversity makes it difficult to conclude regarding digital technology in general.

Research shows that unskilled people are more likely to make incorrect judgements in the domain they are lacking competencies in. Kruger and Dunning (1999, p. 1121) argue that 'the skills that engender competence in a particular domain are often the very same skills necessary to evaluate competence in that domain – one's own or anyone else's'. This notion could be part of an explanation for why the majority of Norwegian teacher educators are stating that digital technology is not essential for good teaching, and at the same time make the assessment that their colleagues are expressing too much confidence in it. The Norwegian teacher educators did score higher than the New Zealand teacher educators on digital competence, but as Kruger and Dunning (1999) claim, 'the incompetent will tend to grossly overestimate their skills and abilities'. Could this inconsistency be linked to a lack of ability to evaluate competence in one's own or anyone else's domain? Drent and Meelissen (2008) write that a lack of ICT competence is often mentioned as an obstacle for the further integration of ICT into education. However, they found that the influence of ICT competence on the innovative use of ICT is limited. They found only a very small indirect effect (0.05).

We therefore find that the lack of skills would be an unjust conclusion, as there is no evidence in the material that this is likely to be the case. Teacher educators are educated pro-

fessionals, and digital competence is just a small part of teaching. To treat this as an isolated area is not possible, as many competencies overlap in the field of education.

The questionnaire was originally developed in Norwegian, and later on translated into English. Some elements may be lost in this translation, and this may influence the standard deviations (SD) in Table 2. This may be caused by different interpretations of the response categories. However, these interpretations appear to have a low impact on the statistical results, and hence, for the statistical tests, equal variance was assumed. Nevertheless, a number of choices had to be made in our study design, and these choices are essential to the quality of every study. In the present study, only quantitative methods are used to address the research question.

CONCLUSION

We have discussed how the apparent incoherence in the results could be understood. There are some indications that many explanations affect the field of the use of and attitudes towards digital technologies in initial teacher education. This article has aimed to add to an understanding of why there is a gap between policy and practice in Norway. There is a gap between what one is 'supposed' to do and what teacher educators are doing, and when researching this phenomenon, double-layered espoused theory with contradictory attitudes are evident. The contradictions must be confusing and disturbing for both developing policies and practices. This article presents the quantitative findings of the study, and on its own these results are open to interpretation.

In this article we have presented different explanations for our findings, and in further research we will look at these results in light of the two countries' curricula. In light of interviews conducted with participants (work in progress), we find it essential to take a thorough look at the different political contexts, and preliminary findings suggests that this also has a large effect on teacher educators and the results of this study. The findings will therefore be followed up with an article based on curricula analysis to further understand these results, and an article based on a strategic selection of participants who have participated in qualitative interviews.

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