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Research paper

Examining the relationship between resilience to digital distractions, ICT self-efficacy, motivation, approaches to studying, and time spent on individual studies

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HIGHLIGHTS

- Identified variation in student teachers' individual studies.
- Motivation associated with individual studies and approaches to study.
- Digital resilience associated with individual studies and approaches to study.
- Females spent more time on individual studies.

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ABSTRACT

This study examines how concepts, such as resilience to digital distractions, ICT self-efficacy, and motivation, relate to student teachers' approaches to studying and time spent on individual studies during pre-service education. The sample comprised 219 first-year student teachers enrolled in Norwegian initial teacher education programs. Student teachers' motivation, resilience to digital distractions, and gender (female) were positively correlated with students' approach to studying and time devoted to individual study. Initial teacher education institutions can emphasise the importance of resilience to digital distraction and encourage student teachers to develop their own approaches to studying and setting aside time for individual studies.

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1. Introduction

The emergence of digital technology has affected many parts of society, including initial teacher training. Digital technology plays a significant role in the journey of student teachers to complete pre-service programmes and become certified teachers. However, studies on higher education have reported that digital technology can be an entertainment machine (Selwyn, 2016) and a time thief (Henderson, Selwyn, & Aston, 2017) and can create distractions (Langford, Narayan, & Von Glahn, 2016). As a concept, resilience to digital distraction can be used to identify student teachers' ability to avoid disturbances caused by or the distractions of digital technology during their studies.

Teaching, instruction, tutoring, and other academic activities in initial teacher education have been enriched by the introduction of digital technology (Langford et al., 2016). It now seems difficult to carry out academic activities in teacher education without digital technology. However, interacting with digital technology requires expertise and skills. Student teachers today have grown up with access to digital technology, but recent research has underpinned the pitfalls of trusting myths about "digital natives and human multitaskers" (Kirschner & De Bruyckere, 2017). These myths about predetermined digital competence based on year of birth, can be detrimental to teacher education and can prevent teacher education from following up with student teachers on the topic of technology in learning and teaching. This shows the importance of identifying student teachers' ICT self-efficacy.

Studies have shown that it is important for students enrolled in higher education to exercise self-regulation and be able to study

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independently of the teaching and guidance available (Panadero & Alonso, 2014; Yot-Domínguez & Carlos Marcelo, 2017; Zimmerman, 2000). Although teaching education features are organized activities, student teachers must also set aside time to lead their own learning process. Teacher education demands that student teachers be motivated to pursue the study programme, be able to use a structured approach to studying, and show perseverance in carrying out their individual studies.

This paper addresses the relationship between student teachers' resilience to digital distractions, ICT self-efficacy, motivation, approaches to studying, and time spent on individual studies (including self-studies and group work) in the first year of teacher education.

2. Background

2.1. Teacher education in Norway

In 2017, Norwegian teacher education became a 5-year integrated master's programme. Teacher education for Norwegian primary and lower secondary schools is divided into separate study programmes: one to teach years 1–7 and one to teach years 5–10 (The Norwegian Ministry of Education and Research, 2016a; 2016b).

Initial teacher education involves activities organized by the institution (e.g., lectures and teacher-led seminars) and non-organized academic work activities, which require student teachers to spend time on their individual studies (including self-studies and group work). As mentioned above, it can be difficult to conduct individual learning and study activities without digital resources or tools (Henderson et al., 2017).

During this study, we reviewed the online syllabi for first-year teaching education courses. The first-year student teachers participate in 6 weeks of internships at schools during their first two semesters; the rest of the time is spent on campus. When on campus, student teachers spend an average of 14 h per week participating in activities organized by the institution (e.g., lectures and teacher-led seminars). The remaining hours of the week are expected to be spent on individual studies (including self-studies and group work).

2.2. Theoretical framework and research hypothesis

This paper addresses factors that explain the extent to which student teachers engage in non-organized academic work activities. Due to the emergence of digital technology in initial teacher education, it is necessary to scrutinize the concept of resilience to digital distractions and how it relates to non-organized academic work activities. In previous studies, students have reported on how they avoid disturbances and distractions while learning (Simons, Beaumont, & Holland, 2018). Others have explained how they use ICT and digital tools in meaningful ways (Henderson et al., 2017; Valtonen, Kukkonen, Kontkanen, Mäkitalo-Siegl, & Sointu, 2018; Valtonen, Kukkonen, Kontkanen, Sormunen, & Dillon, 2015). Resilience to digital distractions can be understood as student teachers' ability to avoid, cope with, or absorb disturbances caused by digital technology.

For some students, digital technologies are an obstacle to their learning (Ozer & Killic, 2015). There are downsides to ICT in higher education (Selwyn, 2016), and access to and use of digital technology can prevent students from learning and performing (Langford et al., 2016). The possible negative outcomes of using ICT include distractions (Selwyn, 2016), reduced critical thinking (Greenfield, 2009), reduced concentration due to multitasking (Alghamdi, Karpinski, Lepp, & Barkley, 2020; Kirschner & De Bruyckere, 2017), lower academic achievement (Junco & Cotton, 2012), and isolation (Bauerlein, 2008; Bowden, 2011). However, within the restrictions caused by the Covid-19 pandemic, ICT can also help to prevent isolation.

The concept of resilience to digital distractions can be used to describe and identify the extent to which student teachers can prevent ICT from becoming a distraction or a problem (Campbell & Henning, 2010; Simons et al., 2018). Recent studies (Christophersen, Elstad, Juuti, Solhaug, & Turmo, 2017; Christophersen, Elstad, Solhaug, & Turmo, 2015) have shown that self-discipline can be an important aspect of prioritizing studies and staying on track in order to avoid disturbance and distractions. Self-discipline can also be linked to the embodiment of the will and control aspects of self-regulated learning (Panadero & Alonso, 2014; Zimmerman, 2000). Resilience to digital distractions is thus related to the ability to plan and control the learning process, as described in research on self-regulation (Yot-Domínguez & Carlos Marcelo, 2017).

We, therefore, assumed that resilience to digital distractions was related to student teachers' approaches to studying and the time they spent on individual studies (including self-studies and group work).

Hypothesis 1. Student teachers with higher levels of resilience to digital distractions are more likely to practice a more systematic approach to studying (H_{1a}) and spend time on individual studies (H_{1b}).

The theory of self-efficacy was first developed by Bandura (1997, 2006). It provides an opportunity to understand what characterizes teachers who succeed in tasks and activities. Previous research has highlighted the importance of teachers' and student teachers' perceptions of their ability to accomplish a task or an activity successfully (Bandura, 2006; Sáinz & Eccles, 2012). Self-efficacy matters when it comes to self-regulated learning (Alghamdi et al., 2020), the way in which teachers teach (Klassen & Tze, 2014), their level of commitment to being teachers (Skaalvik & Skaalvik, 2010; Skaalvik & Skaalvik, 2017; Viel-Ruma, Houchins, Jolivette, & Benson, 2010), and their perspective on their job and career (Aldridge and Fraser, 2016; McLennan, McIlveen, & Pere, 2017).

Bandura (1997) suggests that a domain-specific version of self-efficacy is more accurate and works better as a concept than general self-efficacy. When it comes to digital technology, different concepts can be used to make self-efficacy more domain-specific, such as online self-efficacy (Du et al., 2019), computer self-efficacy (So, Choi, Lim, & Xiong, 2012), and ICT self-efficacy (Fraillon, Ainley, Schulz, Friedman, & Gebhardt, 2014, p. 308). Klassen and Chiu (2010) state that a domain-specific statement about a specific task provides more realistic and authentic information about what student teachers can do than a more general statement (i.e., "I know how to plan my teaching").

When student teachers feel confident about reaching a goal or completing a task, they are more willing to take appropriate steps and to make an effort over time (Klassen & Tze, 2014; Sáinz & Eccles, 2012). We can assume, therefore, that student teachers with higher levels of ICT self-efficacy have a more systematic approach to studying and are more willing to put effort into their studies than student teachers with lower levels of ICT self-efficacy.

Hypothesis 2. Student teachers with higher levels of ICT self-efficacy are more likely to practice a more systematic approach to studying (H_{2a}) and spend time on individual studies (H_{2b}).

Student teachers' motivation is important to their study effort, engagement in non-organized academic work activities (Christophersen et al., 2017; Christophersen et al., 2015), and confidence in their Internet usage (Chang et al., 2014). Interest in a topic or recognizing the benefits of a topic might motivate students

and shape their approach to learning or studying (Deci & Ryan, 2020). Intrinsic motivation means that the students have their own interests and enjoyment of the activities. They do things for themselves, and not due to pressure or as a means to achieve something else or to obtain external incentives. "Play, exploration and curiosity-spawned activities" (Deci & Ryan, 2020, p. 2) are examples of intrinsically motivated actions and activities. In the context of teacher education, this might mean that a student teacher's desire to become a teacher is based on a "desire that pupils should learn or due to a feeling that the profession itself is exciting" (Christophersen et al., 2015, p. 63).

Previous research has shown that interest and motivation can contribute to accomplishment and endurance (Ryan & Deci, 2020, p. 101860). When student teachers feel motivated to pursue their own studies, they may engage more in non-organized academic work activities (Christophersen et al., 2015).

Hypothesis 3. Student teachers with higher levels of motivation are more likely to practice a more systematic approach to studying (H_{3a}) and spend time on individual studies (H_{3b}).

In Norway, females are more likely to attend higher education, including teacher education (Statistics Norway, 2019). Recent research indicates that females perform better in higher education (Borgonovi, Ferrara, & Maghnouj, 2018). Females also report higher levels of effort compared with males during tests and studies; however, gender differences in effort seem to be related to the importance (low stakes vs. high stakes) and context (school-based vs. home-based) of the test (Borgonovi et al., 2018). Participation in non-organized academic work seminars and self-studies can be described as a low-stakes activity, but it can be important for learning and developing (Sprinkle & Urick, 2018). Gender can, therefore, provide sufficient and significant information when trying to understand variations in students' study efforts.

Research also indicates differences between males and females in their study efforts during secondary school (Nielsen & Henningsen, 2018) and higher education (e.g., in accounting studies; Opstad, Bonnesrønning, & Fallan, 2013). Fogarty and Goldwater (2010) found that females spend more time on their studies than males do. One explanation for this difference could be that education represents a different resource for males and females (Nielsen & Henningsen, 2018). Another explanation could be that males and females exert different degrees of effort throughout their studies and the school year. Recent research indicates that females put more effort into low-stakes tests and school-based tests than males do (Borgonovi et al., 2018). Overall, this research supports the assumption that females are more willing to work systematically and put effort into low-stakes priorities, such as non-organized academic work activities.

Hypothesis 4. Females are more likely to practice a more systematic approach to studying (H_{4a}) and spend time on individual studies (H_{4b}).

Above, we have presented and explained the background of each hypothesis. Each of the hypotheses is related to student teachers' (a) systematic approach to studying and (b) time spent on non-organized academic work activities. In this way, we have presented eight hypotheses, all of which are illustrated with arrows in Fig. 1.

In the present study, resilience to digital distractions, ICT self-efficacy, motivation, and gender serve as independent variables. Systematic approaches to studying and time spent on individual studies are used as dependent variables. We have also included a potential association between systematic approaches to studying and time spent on individual studies (including self-studies and group work).

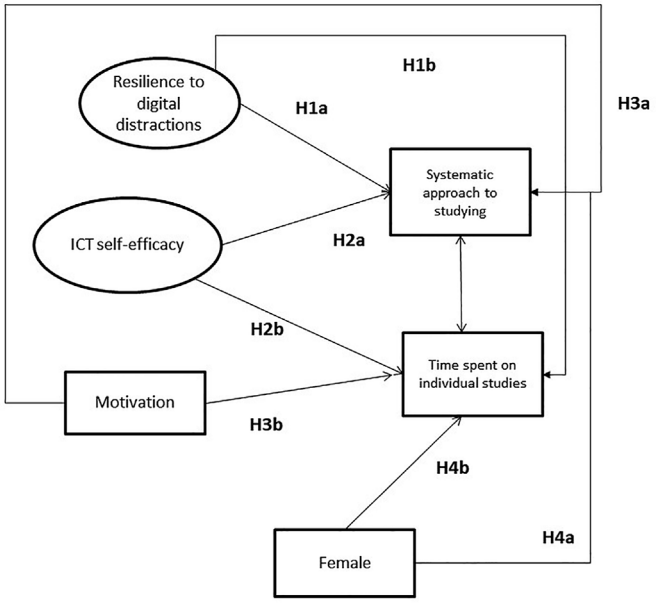

Fig. 1. Model illustrating the hypotheses of the present study.

3. Method

3.1. Sample

A study of first-year student teachers was conducted during the initial teacher training for their introductory programme. A total of 420 first-year student teachers attending two slightly different study programmes — one program to teach Years 1–7 in primary school and one to teach Years 5–10 (see section 1.1)—at a Norwegian university were invited to participate in the study. The students received a link to a study evaluation questionnaire that included questions that measured their motivation, study effort, and attitude towards ICT. Participation in the study and questionnaire was optional. All participants gave their consent to participate before taking the survey. Ultimately, 219 students participated. The response rate was approximately 51.9% of the target group, a value that is recognized as acceptable. Additional information about the student teachers who did not participate in the study is not available.

The study was approved by the Norwegian Centre for Research Data. The Centre evaluated the project and concluded that the study followed the requirements of data protection legislation and other ethical considerations for research.

3.2. Instrument

The student teachers were asked to respond to statements about their resilience to digital distractions, ICT self-efficacy, motivation, systematic approaches to studying, and time spent on individual studies (including self-studies and group work). More information about the statements, descriptive statistics, and analytical measures of the statements is presented in Table 1.

Table 1
Mean (M), standard deviation (SD), median (Mdn), skewness, kurtosis, factor loadings, and standard error (SE) for all items of the administered scales.

Scale Items	*M* (*SD*)	*Mdn*	Skewness	Kurtosis	Standardized factor loadings (*SE*)
Resilience to digital distractions (Cronbach's $\alpha = .90$)					
To what degree do you agree or disagree with the claims?					
The use of ICT disturbs me (reversed)	2.88 (1.20)	3	−0.01	−0.91	0.77 (.03)**
The use of ICT steals time I need to use for learning (reversed)	2.89 (1.18)	3	−0.02	−0.85	.87 (.02)**
The use of ICT makes me postpone my work (reversed)	2.94 (1.26)	3	−0.02	−1.10	0.89 (.02)**
I spend too much time on non-academic activities when I use digital tools (reversed)	2.89 (1.24)	3	0.21	−0.94	0.85 (.02)**
ICT self-efficacy (Cronbach's $\alpha = .60$)					
To what extent do you master these tasks on a computer?					
I can create a presentation with text and images (e.g., in PowerPoint)	1.80 (0.39)	2	−1.54	0.37	0.90 (.03)**
I can use collaborative tools for writing online (e.g., Google Docs, Word Online, or Wikispaces)	1.51 (0.50)	2	−0.03	−2.02	0.85 (.03)**
Motivated					
I am motivated in my studies	3.77 (0.85)	4	−0.56	0.54	–
Systematic work approach					
I take a systematic approach to my studies	2.93 (0.59)	4	−0.39	1.10	–
Time spent on individual studies					
Estimate how many hours you spend per week on individual studies (i.e., self-study, syllabus, assignments and participation in colloquia groups)	10.11 (6.32)	10	0.97	0.78	–

**$p < .01$.
Note. Chi-square ($\chi 2$) = 28.53 ($p > .05$), degrees of freedom = 28 and N = 219. Furthermore, CFI = 0.998, TLI = 0.997, RMSEA = 0.009 [LO 90 = 0.000 and HI = 0.053] and SRMR = 0.074).

3.2.1. Resilience to digital distractions

Four statements included in the questionnaire (e.g., "Use of computers, tablets, or phones disturbs me" and "Use of computers, tablets, or phones makes me delay my work") were used to gather information about how student teachers deal with disturbance and distractions. The questions and categories were inspired by the work of Sørebø, Halvari, Gulli, and Kristiansen (2009). The response categories ranged from 1 ("to a large extent") to 5 ("to a little extent"). Afterward, the scale was reversed so that positive responses corresponded to higher values in the analysis. Lower values were interpreted as lower levels of resilience to digital distractions, whereas higher values were interpreted as higher levels of resilience to digital distractions.

3.2.2. ICT self-efficacy

The survey also contained two statements about the student teachers' ICT self-efficacy: "I can develop a presentation with text and images" and "I can use collaborative tools for writing online". The questions were adapted from a Norwegian national study (Egeberg, Hultin, & Berge, 2016). The responses were coded using categories that ranged from 1 ("to a little extent") to 5 ("to a large extent"). Yet, due to the skewness of items, recoding of the items into dichotomous items was required and conducted. The new categories were 1 (including codes 1–4) and 2 (including code 5, "to a large extent").

3.2.3. Motivation

The student teachers were asked to respond to a statement about their own motivation ("I am motivated in my studies"). The responses were coded using categories ranging from 1 ("to a little extent") to 5 ("to a large extent"). The question was part of a national student survey (Damen, Keller, Hamberg, & Bakken, 2016).

3.2.4. Systematic approaches to studying

The student teachers were asked to indicate if they worked systematically in their studies ("I take a systematic approach to my studies"). The response categories were coded from 1 ("Totally agree") to 4 ("Totally disagree"). The question was part of a Norwegian student survey (Damen et al., 2016).

Motivation in studies and systematic approaches to studying were both measured by a single item. Research suggests that it can be useful to have a measure containing one item or two items in a quantitative study (Zimmermann et al., 2006), identifying, for example, concepts such as quality of life (Desalvo et al., 2006), self-esteem (Robins, Hendin, & Trzesniewski, 2001), and personality (Woods & Hampson, 2005).

3.2.5. Time spent on individual studies

The student teachers were asked to indicate how many hours per week they devoted to study activities that they had to organize themselves or together with other student teachers. We describe these activities as the student teachers' individual studies (including self-studies and group work). This was an open-ended question, and answers were recorded in terms of whole hours. When the students answered with a time interval, we used the average of the interval. The question was part of a yearly national student survey conducted by the Norwegian Agency for Quality Assurance in Education (NOKUT). For more information, see Studiebarometeret (n.d.).

3.2.6. Gender

The student teachers were asked to respond to a question about gender. The response categories were: 1 = female, 2 = male, 3 = other. Dummy codes were used to distinguish between these three groups.

3.3. Analytical perspectives

Data were analysed to identify the characteristics (mean and standard error) and measures of univariate normality in the data (i.e., skewness and kurtosis). The models in Fig. 1, including the eight hypotheses, were tested with structural equation modelling. One advantage of this modelling is the option to combine confirmatory factor analysis of variables with testing of the relationships between the variables. The data consist of a factor (ICT self-efficacy) with two categorical items, and we therefore used the mean- and variance-adjusted weighted least squares (WLSMV) estimation (Kline, 2016) in Mplus.

Four types of measures—the comparative fit index (CFI), the Tucker-Lewis fit index (TLI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR)—were used to determine how well the data supported the tested model. Levels of CFI and TLI close to or above 0.95, RMSEA values below 0.06, and SRMR values below 0.08 were considered acceptable (Hu & Bentler, 1999).

4. Results

4.1. Information about the student teachers

A total of 219 student teachers participated in the study, 48% of whom were attending a teaching education programme for years 1–7, and 52% for years 5–10. The distribution of student teachers from the study programmes was in line with the distribution of the total 420 student teachers (50% enrolled in each of the study programmes; Norwegian Centre for Research Data, 2020).

Further, 67.1% of the sample were female, 32% were male, and 0.9% answered "other". Overall, the gender distribution among the respondents (67.5% females) is in line with the gender distribution among the 420 student teachers (65.5% females) enrolled in the programmes. Most of the student teachers were age 25 younger. In the national population, there are more females between the ages of 20 and 24 than males of the same age enrolled in higher education (Statistic Norway, 2019) and who have completed short-cycle higher education (comprising higher education up to 4 years) (Statistics Norway, 2020).

4.2. Property of the items

The data were analysed using IBM SPSS version 25 and Mplus 7.0. The data were self-reported. The data set was likely to skew slightly to the right due to connotations of the item wordings and social expectations about how one should answer such questions.

Most of the student teachers (66.7%) reported being motivated in their studies; 18% reported being highly motivated. This was expected because the student teachers had applied and entered teacher education of their own free will. However, a small proportion of the student teachers responded that they were not motivated to participate in study activities.

Most of the student teachers reported using systematic approaches to studying. Among all participants, 13% agreed that they used a systematic approach "to a great extent", and 69% agreed that they used one "to some extent". However, there was also a small proportion of student teachers who admitted that they did not study systematically.

Regarding ICT self-efficacy, 80% of the student teachers reported that they could "create a presentation with text and images" "to a great extent"; 51% reported that they could "use collaborative writing tools" "to a great extent". It is not uncommon for young people to report high levels of self-confidence in the use of digital tools and resources (Kirschner & De Bruyckere, 2017).

Regarding resilience to digital distractions, 36% of the student teachers reported that ICT did not disturb them. Many felt that ICT did not steal time (37%) or make them postpone work (39%). Forty-four percent stated that they did not feel they spent too much time on non-academic activities (44%).

The average of the items used to measure motivation, approaches to studying, ICT self-efficacy (recoded), and resilience to digital distractions skewed slightly to the right. Nevertheless, the levels of skewness and kurtosis are acceptable (see Table 1).

Regarding time spent on individual studies (including self-studies and group work), the answers revealed some differences. Thirty-two percent of participants reported spending 5 h or fewer on individual studies, whereas 34% reported spending from 6 to 10 h each week. Nineteen percent reported spending 11–15 h on individual studies each week, and 10% reported spending 16–20 h each week. The average time spent on individual studies each week was approximately 10 h.

4.3. Psychometric properties of the model

All eight hypotheses were tested using the model illustrated in Fig. 1. The model converged with an acceptable solution (see Table 1 and Fig. 2).

All factor loadings were significant and acceptable. The measure of resilience to digital distractions had factor loadings between 0.72 and 0.90. ICT self-efficacy had factor loadings between 0.77 and 0.90. These levels of factor loading are considered high.

Overall, testing the model outlined in Fig. 1 revealed that resilience to digital distractions ($\beta = 0.19$, $p < .01$), ICT self-efficacy ($\beta = 0.04$, n.s.), motivation for study ($\beta = 0.43$, $p < .01$) and gender (female) ($\beta = 0.19$, $p < .01$) explained 26% of the variation in student teachers' systematic approach to their studies (see Fig. 2). Further, resilience to digital distractions ($\beta = 0.19$, $p < .01$), ICT self-efficacy ($\beta = -0.13$, n.s.), motivation for study ($\beta = 0.24$, $p < .05$) and gender (female) ($\beta = 0.18$, $p < .01$) explained 14% of the variation in time spent on individual studies (see Fig. 2).

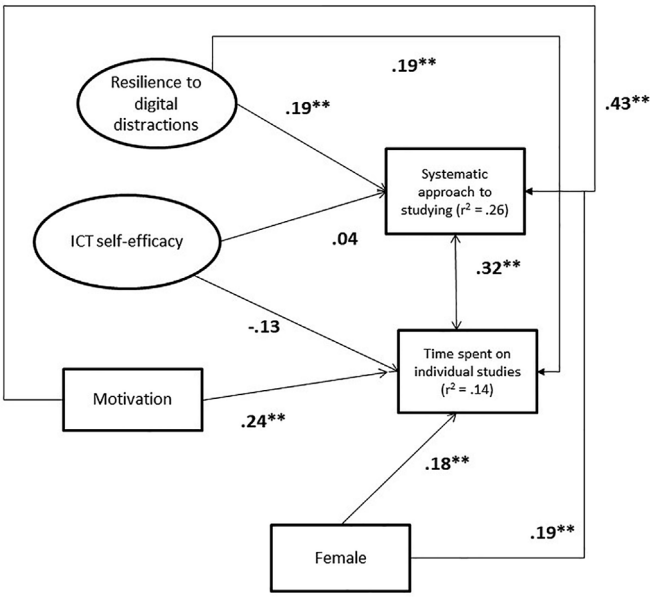

Fig. 2. Tested model (Fig. 1) with regression coefficients and explained variation in the dependent variables. *p < .05; **p < .01.

5. Discussion

The main object of this paper was to examine the relationship between student teachers' resilience to digital distractions, ICT self-efficacy, motivation, approaches to studying, and time spent on individual studies. Eight hypotheses were developed to describe how resilience to digital distractions, ICT self-efficacy, and motivation might be associated with both approaches to studying and time spent on individual studies.

The results support the expectation that resilience to digital distractions explains variation in student teachers' systematic approaches to studying (H_{1a}) and time spent on individual studies (H_{1b}). This indicates that resilience to digital distractions involves elements of control or discipline within a digital context. Resilience to digital distractions seems to capture the extent to which student teachers can stay on track during their studies and during other non-organized academic work activities (Simons et al., 2018). The findings indicate that the potential benefits of resilience to digital distractions (H_{1a} and H_{1b}) are consistent with the findings of recent research. For example, studies have shown how self-discipline (Christophersen et al., 2017) and self-regulated learning (Panadero & Alonso, 2014; Yot-Domínguez & Carlos Marcelo, 2017) are positively correlated with student participation in non-organized academic work activities. Control within individual studies can be a common feature of resilience to digital distraction, self-discipline, and self-regulated learning. The concept of resilience to digital distraction can contribute to research by clarifying its relationship to individuals' studying and role in shielding individuals' studies from digital distractions.

Young people report high levels of confidence when it comes to digital technology (Kirschner & De Bruyckere, 2017; Sumuer, 2018). We did not find support for the hypothesis that ICT self-efficacy can explain variation in student teachers' systematic approach to studying (H_{2a}) and time spent on non-organized academic work activities (H_{2b}). This is surprising given that recent research has shown how self-efficacy significantly impacts how students perceive their opportunities to perform activities successfully (Bandura, 2006) and their levels of commitment to these activities (Skaalvik & Skaalvik, 2010). We hypothesized that students who reported higher levels of self-efficacy would be more willing to spend time studying and working systematically. One explanation for the discrepancy in the results could be that the students were so confident in their chance of success that they did not need to spend more time studying or use specific approaches to studying. Another explanation could be that the statements dealt with using ICT in presentations and collaborative writing specifically. The items could, therefore, have been too narrow because student teachers can use digital technology when searching for online resources, reading digital literature, taking notes on a computer or tablet, and writing individual texts and assignments. One further step could be to gain a greater breadth of items about self-efficacy by linking the items to various individual activities in which student teachers use digital technology.

There is significant support for the hypothesis that motivation can explain variation in student teachers' systematic approaches to studying (H_{3a}). Additionally, it is support for the hypothesis that motivation can explain variation in time spent on individual studies (H_{3b}). This is consistent with the findings of recent research; for example, Christophersen et al. (2017) reported that motivation is positively correlated with students' ability to work on their own and willingness to spend time on their studies. One explanation could be that working at a subject provides the experience of mastery and the expectation of success (Chang et al., 2014). It could be that student teachers who are interested in their study activities experience a commitment to work independently because they feel that they are doing the activities "for their own sake" (Ryan & Deci, 2020, p. 2). It could also be that time spent on individual studies is less visible to other student teachers and university teachers. In this case, it would be advantageous for student teachers to be motivated.

The present study sample exhibited gender differences, suggesting that gender—being female specifically—can explain variation in student teachers' systematic approach to studying (H_{4a}) and time spent on non-organized academic work activities (H_{4b}). Female participants reported that they were able to work more systematically and that they spent more time on their individual studies compared with the other student teachers. This is in line with the findings of previous research on upper secondary schools (Nielsen & Henningsen, 2018) and higher education (Opstad, Bonesrønning, & Fallan, 2013). Borgonovi et al. (2018) argue that the effort of females and males is dependent on what is at stake. The characteristics of study activities, such as working systematically and participating in non-organized academic work activities, provide low stakes, and there is minimal risk of loss. Women seem more willing to invest effort in these types of low/no-stakes activities, while men's efforts are more dependent on higher-stakes situations (Borgonovi et al., 2018). Nevertheless, it is important to devote time to individual studies in order to get acquainted with the literature, work on assignments, and discuss theories and concepts with other student teachers. This can be done in a less stressful way during individual studies and can provide good experiences and understandings of theories and concepts (Sprinkle & Urick, 2018).

As mentioned in section 4.2, the student teachers reported spending an average of 10 h a week on individual studies. The average time spent on organized study activities was about 14 h per week. This means that the average student teacher spends approximately 24 h a week on academic studies (organized and individual). As student teachers are expected to work full-time in their studies, our findings indicate that many student teachers have the potential to devote more time to their individual studies.

The present study has some limitations that must be mentioned. First, the study involved student teachers from only one university. We do not know if the study is representative of all Norwegian student teachers, but the findings are in line with other research from other countries and universities. Second, the response rate was 51.9%; it would be better to obtain a higher response rate. However, it would be challenging to obtain a higher response rate without visiting campus activities (e.g., lectures) in person. Third, this was a cross-sectional study, and have therefore carried out an analysis of variance based on a model inspired by recent research. Fourth, we used a self-reported questionnaire. Therefore, we cannot determine the extent to which the student teachers over-rated or under-rated their own study efforts, approach to studying, or resilience to digital distractions. It is important to follow up using other types of studies. Self-reported measures could be complemented with the use of assignments, quizzes and tests to provide information about proficiency or attitudes. Fifth, some variables were measured with single items (motivation, approaches to studying, and time spent on individual studies) or only a few items (resilience to digital distractions). Most of the measures were based on other studies, but it is necessary to continue to develop statements regarding precision and further development.

6. Conclusions, practical implications, and avenues for further research

The aim of this study was to examine the relationship between student teachers' resilience to digital distractions, ICT self-efficacy, motivation, approaches to studying, and time spent on individual

studies (in addition to lectures and seminars organized by the institution). One main finding was the variation in student teachers' reported approaches to studying and willingness to spend time on individual studies (including self-studies and student-led group work).

The present study highlights the distinction between having a systematic approach to studying and being willing to spend time on individual studies. From a theoretical perspective, both these activities are important to student teachers' ability to carry out teacher education studies and advance themselves professionally as future teachers.

It seems that many student teachers spend fewer hours per week on individual studies than might be expected. One disadvantage of this could be that they do not spend enough time reading the necessary syllabus, participating in discussions with their peers, or completing their assignments. It is, therefore, important that initial teacher education examines how to support student teachers in setting aside enough time for individual work. It can be advantageous for the institution to facilitate the type of study work that takes place through individual study and in groups. This can be achieved by giving assignments or work requirements in colloquium groups.

Further, student teachers' motivation is closely related to how they choose to work and how much effort they are willing to make. This is in line with the findings of previous research, but more information about the mutual influence of motivation and effort is required. The institution and student teachers could collaborate to identify what student teachers find motivating and how institutions could help to strengthen student teachers' approaches to studying.

Student teachers have access to digital resources, tools, and media outside of their lectures and seminars. Studies have shown that young people may need support when it comes to using digital technology successfully in their own learning. Student teachers might benefit from tips on how to control and manage their individual studies to avoid or prevent digital distractions. In this way, student teachers could develop an awareness of how to increase their resilience to digital distractions.

The findings of the present study suggest that resilience to digital distractions is a relevant concept for understanding what student teachers and teacher education programmes can do to develop and support being able to plan and carry out activities without being affected by the access to digital technology. Overall, more research is required to develop items to identify resilience to digital distractions and to learn more about how teacher education can inform student teachers about the potential importance of resilience to digital distractions.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.tate.2021.103326.

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