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Digital skills critical for education: Video analysis of students' technology use in Norwegian secondary English classrooms

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Abstract

Background: Globally, digital skills are a crucial aspect of education that schools should develop systematically. Research on digital skills tends to be measured using self-reports, performance tests or interventions. There is less knowledge about student and teacher uptake of technology in school, making it important to investigate the actual use of technology and digital skills in authentic classroom settings.

Objectives: This study contributes unique baseline data concerning students' use of technology and digital skills across mandatory English courses in real classroom settings in secondary schools in Norway over time.

Methods: The study adapted a national framework for digital skills into an observation protocol. With it, this study analysed videos from 60 naturally occurring English lessons in 13 English classes at seven lower secondary schools over two school years (grades 9 and 10), following 186 students (aged 13–15) and 10 teachers.

Results and Conclusions: Students used digital skills critical for education in half of the video-recorded English lessons, with more digital skill use at some schools over time. The main finding across classrooms and school years regards students' use of basic, not advanced, digital skills.

Takeaways: Although teachers provide opportunities for students to use digital skills in school, more advanced skills are needed. This work calls for continued use of video recordings to provide systematic comparisons of potential shifts in students' digital skills in real English secondary classroom settings over time.

KEYWORDS

case study, dialogue/argumentation, formal learning, information systems, qualitative, quantitative, secondary, skills, sociocultural, video, video analysis

1 | INTRODUCTION

Digital technologies are crucial to global educational policy, with a consensus that students need extensive experience with information and communication technology (ICT) to meet the critical demands of education and that ICT can complement, enrich and transform education (Erstad et al., 2021; Ferrari, 2013; Hatlevik et al., 2015; Livingstone et al., 2021; Saikkonen & Kaarakainen, 2021; The United Nations Educational, scientific and Cultural Organization [UNESCO], 2022). The United Nations specialized agency for ICTs, the International Telecommunication Union (ITU), argues the skills to use ICT "are fundamental for participation in an increasingly digital

world" and defines digital skills as "the ability to use ICTs in ways that help individuals to achieve beneficial, high-quality outcomes in everyday life for themselves and others, now and in an increasingly digital future" (ITU, 2018, p. 23).

Society's accelerated ICT use is reflected in schools and gives students opportunities for developing digital skills, undertaking new challenges and connecting the outside world to the classroom (Li & Walsh, 2010; Lund, 2021; Tai & Wei, 2021; Wu, 2018). While technology can enhance learning, notably, in schools, access alone does not reliably predict ICT implementation in the classroom (Baydas & Goktas, 2016; Bingimlas, 2009; Gil-Flores et al., 2017). Research has repeatedly shown crucial differences between providing access and preparing students to utilize technology they access in classrooms (Andreasen et al., 2022; Gil-Flores et al., 2017; Li & Walsh, 2010). We emphasize this point because public debates on technology target device access, not pedagogical choices and students' digital skills (Jewitt et al., 2007; Livingstone et al., 2021; Salomon, 2016).

We argue that technological use matters more than availability. Clear subject reasoning is needed behind increases in digital device use in classrooms (Lund, 2021; Saikkonen & Kaarakainen, 2021), especially in secondary school, where students face increasingly complex expectations of ICT use in a range of school subjects. With Norwegian lower secondary schools as the context, this study systematically examines students' digital skills across 60 naturally occurring English lessons recorded in 13 classes at seven schools over two school years, following 186 students (aged 13–15) and 10 teachers. The aim was to contribute unique baseline data concerning students' demonstrations of digital skills to use ICT in real classroom settings over time. Investigations into how teachers provide opportunities to use ICT in the classroom can inform policymakers about technology implementation in natural classroom settings and, most importantly, inform educators about possible ways to develop students' digital skills in real classroom settings. Consequently, the following review sections are organized into three themes: (1) developing students' skills for a digital world, (2) students' opportunities for English digital skills use, and (3) the need for systematic video studies of technology uptake.

2 | DEVELOPING STUDENTS' SKILLS FOR A DIGITAL WORLD

Students' digital skills have received increased attention in recent years (ITU, 2018; Livingstone et al., 2021; Organization for Economic Cooperation and Development [OECD], 2015). The broader literature on ICT use in education is even more extensive, including overlapping concepts like digital competence (Erstad et al., 2021; Olofsson et al., 2021), digital learning (Harju et al., 2019; Niu et al., 2022), digital literacy (Buckingham, 2015; Scolari, 2019) and digitalisation (Lund, 2021; OECD, 2015). Many methods measure students' digital skills; few are applied and tested (ITU, 2018). Digital skill research among secondary-school students is measured using self-reports, performance tests or interventions (Erstad et al., 2021; Hatlevik et al., 2021; ITU, 2018; Livingstone et al., 2021). Teacher and student self-reports include surveys and interviews (Bhutoria & Aljabri, 2022; Egeberg et al., 2011; Fütterer et al., 2022; Juuti et al., 2022; Kaarakainen & Saikkonen, 2021; Kongsgården & Krumsvik, 2016; Konstantinidou & Scherer, 2022; Kurt & Bensen, 2017; Scolari, 2019; Wasson & Hansen, 2014; Xu & Peng, 2022), whereas trials and interventions tend to be case-based (Amendum et al., 2018; Fütterer et al., 2022; Levine, 2014; Patel et al., 2022; Wu, 2018).

Conversely, performance tests measuring students' digital competence typically use large-scale data, like the International Computer and Information Literacy Study (ICILS; Hatlevik & Throndsen, 2015; Hatlevik et al., 2021; Throndsen & Gudmundsdottir, 2015). Digital competence varies, with Norwegian lower secondary students having high and low proficiency (Hammond, 2014; Hatlevik et al., 2013). ICILS 2013 revealed that, in Norway, technology was not used in many school subjects, identifying a gulf between technology use at home and school (Hammond, 2014; Hatlevik et al., 2013). Correspondingly, the latest Teaching and Learning International Survey (TALIS) report from Norway reveals the main area in which teachers want professional digital competence (PDC) development concerns how to integrate ICT into subjects (Throndsen & Hatlevik, 2019). This corroborates ICILS 2018 (ITA, 2018), namely, that youths do not develop sophisticated digital skills due to vast digital experience while growing up. ICILS 2018 also identified a digital divide regarding students' socioeconomic status (ITA, 2018). Students from higher socioeconomic backgrounds had significantly higher scores in digital competence, underscoring the significance of teaching students digital technology use and supporting their ICT use in a formal setting, not assuming all students will develop competence independently.

While access to digital technology is necessary for digital skill use in school, research demonstrates such uptake can be limited and narrow, often revolving around individual tasks, students' uses of specific digital tools or teachers using presentation tools traditionally (Blikstad-Balas & Klette, 2020). In primary and lower secondary schools in Norway, a case study analysed iPad practices in language arts, mathematics and social studies. While tablets enabled overall technological use, it was narrow, with clearly missed opportunities for collaboration, sharing and interaction (Kongsgården & Krumsvik, 2016). Another example was a large-scale video study investigating lower secondary teachers' ICT practices across 48 language arts classrooms, with mostly very traditional Microsoft Word use for students and PowerPoint for teachers (Blikstad-Balas & Klette, 2020). When COVID-19 forced schools into lockdown overnight in Norway, researchers found students were often asked to use technology in transmissive, traditional ways to solve individual tasks, not communicate or collaborate in real time (Blikstad-Balas et al., 2022) – again underscoring that giving students opportunities to expand their digital repertoire concerns more than giving each student a laptop and software.

3 | STUDENTS' OPPORTUNITIES FOR ENGLISH DIGITAL SKILL USE

When we discuss the English subject, we refer to English as a second language (L2). As language learning increasingly goes online and

English remains the dominant online language, we witness students enter and reside in a communicative space much richer in complexity than the traditional subject could offer, particularly when English is a second or additional language for students (Beiler & Dewilde, 2020; Murray, 2020; Tai & Wei, 2021). When digital resource use in the language classroom is narrow or transmissive, technology-enhanced situations conducive to learning English are found in interactions between teachers, students and digital technology, not necessarily in the sophistication of digital resources (Brevik & Davies, 2016; Gilje et al., 2016; Lund, 2003).

English is particularly relevant as a starting point when investigating technology use in schools, because the highest-quality apps, websites, programs and content are in English. In countries where English is taught as an L2, teachers have far better access to content through the internet than their colleagues. During the last decade, technology use in English has received considerable attention (Brevik & Davies, 2016; Lund, 2003; Tai & Wei, 2021), although studies have targeted teachers' ICT use in language classes as a teaching aid, indicating "computer use is mainly limited to PowerPoint presentations of pictures, grammar and sentence structures" (Li & Walsh, 2010, p. 99). Little empirical research has qualitatively examined how secondary students use digital technology for language learning (Bergstrom, 2019; Tai & Wei, 2021).

Some studies have examined how digital devices facilitate students' reading and listening skills, oral proficiency or motivation in learning a second or additional language (Brevik & Davies, 2016; Tai & Wei, 2021). Other studies have addressed students' digital skills in the L2 English subject using new genres, like blogs and wikis (Lund, 2003), fan fiction (Sauro et al., 2020; Sauro & Sundmark, 2019) and language learning through immersion in game-based virtual worlds (Brevik & Holm, 2022; Sykes, 2018; Zheng et al., 2009). Additionally, studies have demonstrated new uses of traditional tools in L2 English lessons, like iPads for speaking practice in language classes (Lys, 2013), monolingual online dictionaries, thesauruses, machine translation services (Beiler & Dewilde, 2020) and digital storytelling (Normann, 2012). Research in secondary-school classrooms depicts digital technology drives English learning and digital skills in English; when digital technology serves a clear function in the classroom, it does not merely serve as an add-on to English class but offers new possibilities for language learning.

4 | NEED FOR SYSTEMATIC VIDEO STUDIES OF TECHNOLOGY UPTAKE

As we have argued, drawing on studies in the first part of this review, providing students or teachers with ICT equipment alone does not ensure students' digital literacy. Successful technological use in the classroom relies on technological access and the everyday choices of teachers who integrate technology into instruction. This insight has significant methodological implications. Many valuable studies investigate questions of access and measure students' digital competence through self-reports, performance data, case studies or interventions, though limited studies have observed teacher and student uptake of technology in authentic classroom settings. This is problematic if we want to study students' individual competence and systematically investigate their educational opportunities to improve and expand how they use technology for learning – because such questions of actual use in education require contextual data from authentic classrooms. We must design studies that illuminate if and how teachers offer opportunities to develop digital skills and how much students use them.

The reasons for the methodological gap and lack of systematic studies exploring authentic teaching situations perhaps are that it is demanding to investigate actual uptake in complex, authentic instructional contexts, especially in moving beyond single cases. There is a need to document and label actual ICT use in classrooms and be systematic in tracking students' digital skills and experiences (Fütterer et al., 2022; Stevenson, 2013). Significant methodological and contextual differences influence ICT observation in classrooms, which must be considered when studying students' use of digital skills.

Video studies are often described as game changers in educational research because they provide continuous, repeated access to complex classroom interactions. While this can be valuable in small case studies, it is also possible to gather and compare data across lessons, subjects and even countries. In the United States, the Measures of Effective Teaching (MET) project (MET Project, 2009; see also Kane & Staiger, 2012) collected 20,000 videotaped lessons over a period of 3 years (2010–2013), to study the construct of teaching quality across subjects and classrooms (e.g., Blazar & Kraft, 2017; Briggs & Alzen, 2019; Campbell & Ronfeldt, 2018; Cantrell & Kane, 2013; Jensen et al., 2018; Kane & Cantrell, 2010; Schultz & Pecheone, 2014; White et al., 2022a, 2022b).

In the Nordic context, large-scale video studies have documented instructional practices in authentic lower secondary classroom settings within and across subjects and countries. For example, in language arts lessons in over 100 classrooms in Finland, Iceland, Norway and Sweden, literature use was studied to determine how lessons were organized, which literary genres were read and why they were used across classrooms (Gabrielsen et al., 2019; Gabrielsen & Blikstad-Balas, 2020; Nissen et al., 2021). In language arts and L2 English lessons in Norway and Sweden, video data have contributed detailed information about reading and writing practices, including uses of digital texts (Blikstad-Balas et al., 2018; Brevik, 2019; Magnusson, 2020, 2021; Magnusson et al., 2019; Tengberg et al., 2022). Video studies have also documented authentic classroom practices in mathematics, English and French in Norway (Brevik & Rindal, 2020; Luoto, 2020; Luoto et al., 2022; Stovner & Klette, 2022; Stovner et al., 2021; Vold, 2020, 2022; Vold & Brkan, 2020).

These studies indicate that, although several observational studies have systematically recorded videos of real classroom settings in secondary school and some studies have identified certain uses of technology, there is a lack of studies systematically mapping students' ICT use or digital skills in classrooms, particularly to study students' ICT use and digital skills in the English subject context.

The methodological gap demonstrated above emphasizes the need for this study by using video data to systematically compare students' use of digital skills in large, systematically sampled English classroom settings over time. Thus, this work aims to contribute unique

data to future research to determine a baseline regarding digital skills and practices based on a large student sample (cf. Creswell & Creswell, 2018; Tashakkori et al., 2020; White et al., 2022a, 2022b). The aim is to give perspective on classroom technology use and to broaden the research interest in video observations, revealing how digital skills are used in authentic English classroom settings. Hence, our research questions are as follows:

1. What characterizes the use of digital skills among students in real English classroom settings in lower secondary schools in Norway?
2. To what extent are there observable changes in the participating students' use of digital skills over time?

5 | THE NORWEGIAN CONTEXT

Norway is an interesting case for analyses of ICT and digital skills in educational settings. Of Norwegians, 98.4% have internet access compared to the global average of 65.6% (Internet World Statistics, 2021). Norway has had bold ambitions for digital technology in schools since the 1980s (Klausen, 2020), and the national research agenda prioritizes investigations of technology uptake (Erstad, 2006; Gilje et al., 2016). Overall access to technology has been consistently high in Norwegian schools and significantly above the European average for the student-per-laptop ratio (OECD, 2015). While 1:1 access is the norm in Norwegian upper secondary schools (ages 16–18), most lower secondary schools (ages 13–15) also provide permanent 1:1 access or lend students laptops or tablets for lessons. Norway was among the first countries to include digital skills as a core element of a national curriculum implemented across subjects (Erstad, 2006; Erstad et al., 2021; Lund, 2021). Thus, Norway's curriculum for grades 8–10 emphasizes digital skills (Norwegian Directorate for Education and Training [NDET], 2012; Norwegian Ministry for Education and Research [NME], 2013). Grade 10 transitions students between lower and upper secondary schools, indicating teachers might ensure students have relevant digital skills to meet the increased demands of their new curriculum.

6 | METHODS

This study is part of a large-scale longitudinal video project Linking Instruction and Student Experiences (LISE), which systematically recorded 340 lessons in real classroom settings across subjects in seven Norwegian secondary schools from 2015 to 2022, comprising three student cohorts in the same schools. Like Nassaji (2015), data were collected "in their naturally occurring settings without any intervention or manipulation of variables" (p. 129).

6.1 | Research design

This study is the first to investigate the naturally occurring use of ICT and digital skills in this corpus. To our knowledge, it is also the first to use video data to systematically track secondary-school students' technology use in real classroom settings over time, contributing unique baseline data to future research to determine a baseline regarding digital skills and practices based on a large student sample (cf. Creswell & Creswell, 2018; Tashakkori et al., 2020; White et al., 2022a). Video data provide opportunities for researchers to observe raw data multiple times and discern details that other data types do not capture (Klette, 2020). Such data are challenging to collect and analyse and valuable for systematic, comparative and longitudinal analysis, providing in line with Rowan et al. (2020), "an example of the way classroom video might be deployed and collected across multiple sites, thus raising statistical power to make claims about what is happening in classrooms across multiple contexts" (p. 8).

6.2 | Sampling

To reflect variations between Norwegian schools, participating schools were strategically sampled for variations in student achievement based on national reading tests and demographic, geographic variations (cf. Klette et al., 2017). With a national curriculum, expectations concerning digital skills were identical for all classrooms. We believe the careful sampling of schools contributed to a varied overall sample that provides new insight into how digital skills are embedded within and across single classrooms over time (cf. Brevik, 2019; Brevik & Rindal, 2020). Herein, we used all video data from English lessons among the first student cohort, totalling 60 English lessons in grades 9 and 10, following 186 students (aged 13–15) and 10 teachers from 2015 to 2017. For this sample, English reading tests illustrated achievement levels on or above the national average with a variation of close to one standard deviation; the proportion of students with first languages other than Norwegian varied between 4% and 26% in each classroom; demographic and geographic variation across three school districts included urban, suburban and rural schools in areas of low, medium and high socioeconomic status, respectively (Brevik & Rindal, 2020).

6.3 | Video-recorded lessons

Video material offers unique opportunities to observe students' digital skills in real classroom settings across schools, school years, classrooms and English lessons. Using video-recorded material supports detailed, systematic observations of complex classroom situations and natural settings over time, describing data so others can confirm their accuracy through an audit trail available for evaluation and confirmation (Klette, 2020; Nassaji, 2015, 2020). The design relied on two cameras simultaneously recording each lesson, one camera facing the teacher and one facing students, using two microphones, one attached to the teacher and one fixed to capture classroom communication (Brevik & Rindal, 2020; Klette et al., 2017). Video analysis is a less intrusive, more neutral process than in-situ observation. For 2 weeks, each classroom was recorded for four to six consecutive

TABLE 1 Video-recorded English lessons ($N = 60$) in the first student cohort (2015–2017)

Grade	S02	S07	S09	S13	S17	S50	S51	Total
9	6	4	6	4	4	5	4	33
10	0	4	5	4	5	5	4	27

English lessons each school year (Table 1). The frequency was designed to maximize the likelihood of the reliable observation of classroom practices based on generalisability studies (Cohen et al., 2016).

6.4 | Analytic instrument: Digital skills framework

Our main analytical starting point was the Framework for Digital Skills, which emphasizes the introduction of digital skills into the Norwegian curriculum (NME, 2013). There are clear advantages to using established observation protocols to analyse classroom practices, like the possibility of conducting comparative, cumulative research drawing on validated observation systems (Bell et al., 2019). However, no common coding manual existed for observing students' digital skills in the classroom, although several international frameworks for measuring students' digital competence exist, like the Framework for Developing and Understanding Digital Competence in Europe (DIGICOMP; Ferrari, 2013) and the International Computer and Information Literacy Study (ICILS) framework (Hatlevik & Throndsen, 2015). When comparing the ICILS framework and the Norwegian framework for digital skills, Hatlevik and Throndsen (2015) found a high degree of thematic overlap. Based on this overlap, we used the Framework for Digital Skills (NDET, 2012) as an observation protocol in our analysis. This study is the first to use this framework to systematically record and analyse students' use of digital skills in real-world settings. The framework defines digital skills as follows:

> Digital skills involve being able to find and process information, being creative and design digital products using digital resources, communicate and collaborate with other people in digital contexts. They involve being able to use digital resources efficiently and responsibly to solve practical tasks. Digital skills also include developing digital responsibility by acquiring knowledge and good strategies for the use of the Internet. (NDET, 2012, p. 12; see also NDET, 2017; NME, 2013, 2020)

Therefore, the NDET (2012, 2017) framework addresses the ability to use ICT regarding ITU's (2018) and UNESCO's (2022) emphasis that ensures individuals have relevant digital skills for an increasingly digital future. The framework also addresses the ability to reflect on and conduct digital responsibilities. As such, the framework for digital skills covers students' progression through five levels, each representing four digital skills: search and process, produce, communicate and digital responsibility. The framework description involves multiple criteria for each subskill. To assign a level, it is sufficient to observe one criterion. Table 2 summarizes the framework for secondary education.

1. Search and process captures the ability to learn, use, interpret and assess information from digital sources appropriately and critically, and to apply references. Information from digital sources can originate from text, sound, picture, video, symbols, interactive elements or raw data from registrations and observations. According to the framework, there is a conceptual disparity between "master search strategies" (Level 4) and "advanced search strategies" (Level 5). Thus, where advanced search strategies were observed, higher levels were assigned.
2. Produce captures creativity using digital resources. This includes creating digital products using digital resources through creating products or developing and reusing them. It involves following digital requirements to emphasize and communicate messages using effects, pictures, sound, illustrations, tables, headings and points. A key consideration is the difference between creating digital composite texts using "digital sources" (Level 2) and "digital formal requirements" (Level 3). Thus, where no evidence of using formal requirements for a digital text was observed in videos, lower levels were assigned.
3. Communicate captures the use of digital resources for communication and interaction. Digital interaction involves using digital resources for planning, organizing and conducting learning with others, for example, through co-writing and sharing. A key consideration is the divergence between using "simple digital tools" (Level 1) and "a selection of digital tools" (Level 2). Thus, where evidence of students using a selection of digital tools was identified in videos, Level 2 was assigned.
4. Digital responsibility captures the ability to follow rules to protect privacy and ethical conduct on the internet. It uses strategies to avoid unwanted situations and demonstrates the ability to reflect ethically and assess one's role on the internet and in social media. A key consideration is the difference between "apply netiquette" (Level 3) and "use the internet and social media efficiently and appropriately" (Level 4). Accordingly, where evidence of appropriate media use was observed in videos, Level 5 was assigned.

6.5 | Data analysis

To measure how many lessons used digital skills and their duration, we analysed data in three phases, presented below. The overall analytical goal was to qualitatively analyse the entire sample, (a) identify students' use of digital skills, including what was said and done, and (b) identify recurring digital skills by describing and interpreting those categories, and then quantitatively, (c) convert categories into frequencies and percentages for comparison across classrooms and school years (cf. Nassaji, 2015). We scored all phases of data analysis using the *InterAct* program, which offers synchronized viewing, coding

TABLE 2 Framework for digital skills as basic skills (NDET, 2012)

Subskills	Level 1	Level 2	Level 3	Level 4	Level 5
Search and process	Can read hypertexts and simple interactive information. Can use picture- and icon-based navigation.	Can make simple digital searches and read and interpret information from digital sources. Can use simple digital resources and tools for information processing and learning.	Can choose and use search strategies and assess information from digital sources. Can use different digital tools and resources for information processing and learning.	Can filter, transform and collate information from digital sources. Can use relevant search tools and master search strategies in subject-related tasks.	Can find, organize and update digital information. Can use advanced search strategies and sources in subject-related work.
Produce	Can write simple texts on a keyboard and produce simple composite texts. Knows simple digital use of sources and copyright rules.	Can produce digital composite texts following simple formal requirements. Can make simple use of digital sources, observing copyright rules, also in reuse and further development.	Can make digital composite texts with linked content. Can understand and use digital formal requirements in one's own texts. Can refer to digital sources and apply copyright rules.	Can produce and edit complex digital texts. Can refer to and assess digital sources in relevant subject-related situations.	Can choose and use target group relevant digital tools and digital formal requirements. Can administer copyright rules to one's own digital products and master digital source referencing.
Communicate	Can use simple digital tools and media for presentation and communication.	Can use a selection of digital tools and media for presentation and communication.	Can make varied use of different digital tools and media to convey a message both in one-to-one and group communication.	Can use digital media and tools to convey a clear and detailed message for communication and documentation.	Can choose, assess and apply digital communication tools according to different subject-related needs.
Digital responsibility	Can follow basic rules for digital interaction. Knows basic rules for the protection of personal privacy on the internet.	Can apply basic netiquette and knows about rules for protection of personal integrity on the internet.	Can apply netiquette and follow rules for protection of personal integrity on the internet and in social media.	Can use the internet and social media efficiently and appropriately.	Can reflect ethically on and assess the internet and social media as a communications and information channel.

Note: The framework was developed in 2012 and refined in 2017. We used the 2012 edition as it was in force during data collection.

and statistical analysis of video-recorded data. Following the Framework for Digital Skills (NDET, 2012), each segment was scored 1–5 based on increasing evidence of each digital skill, from some evidence of basic digital skills (Level 1) to consistently strong evidence of advanced digital skills (Level 5). For each segment, all four digital subskills and levels were observed and assigned if one or more students used the skill. This procedure enabled us to systematically investigate students' use of digital skills.

1. Phase 1: Identifying lessons and segments containing ICT and digital skills. Across English lessons, we identified all lessons involving ICT-related activities. This initial identification consisted of the first author systematically observing lessons to determine whether they contained ICT use—or references to it—linking to students' digital skills. This acknowledged analytic process systematically targeted aspects of a large data corpus (Creswell & Creswell, 2018). Rare borderline cases were discussed with the broader research team. English lessons in lower secondary school cover many content domains and basic skills, meaning lessons are not solely dedicated to developing digital skills. Therefore, many activities in video-recorded lessons are not relevant to this study. To systematically analyse relevant ICT uses, we divided English lessons into 15-minute segments and identified all segments containing ICT-related activities. We excluded segments with ICT not involving students' digital skills, like teachers using ICT for presentations, students' use of mobile phones unrelated to English lessons and students with unused computers on their desks. This procedure identified 74 relevant segments across 29 English lessons.
2. Phase 2: Coding of framework for digital skills. After identifying all relevant segments containing ICT-related activities, we coded the video recordings in two parallel processes. First, the first author coded segments based on the Framework for Digital Skills (NDET, 2012). Depending on the amount of evidence of ICT use in each 15-minute segment, the first author assigned codes using a 5-point scale (see Table 2), reflecting the highest achieved digital skill level for each 15-minute segment. For example, within one segment, a student may have demonstrated how to produce digital composite texts following simple formal requirements with evidence indicating a score of 2, while typing simple texts for a score of 1. However, when a student engaged in the subskill of produce by writing digital texts multiple times in a segment, only the highest score was recorded. Second, because each 15-minute segment was scored for four subskills (see Table 2), each segment was analysed to ensure a systematic overview of all digital subskills demonstrated within each segment. For example, in only one segment, a student may have demonstrated how to make simple digital searches and read and interpret information from digital sources with evidence of a score of 2 for the subskill search and produce, while using simple digital tools and media for presentation and communication with a score of 1 for the subskill communication. Whereas the framework describes digital skills by operationalizing four subskills on five levels, we needed to ensure we captured all relevant occurrences, even when these co-occurred in a segment, for a more complete overview of the total repertoire and level of digital skills.
3. Phase 3: Double coding. To ensure reliability and transparency, the first author coded and reanalysed data after six, 12 and 16 months; Anmarkrud and Bråten (2012) argued, "such intra-rater agreement has been discussed and used to assess reliability in qualitative research by several authors" (p. 605). Comparisons of coding into categories indicated satisfactory overlap, with high consistency across segments and time. Subsequently, the second author double-coded 20% of the material. Double-coded segments were selected to ensure a spread across schools, teachers and grades, and the verified scores in this subsample varied. This double coding revealed an inter-rater agreement of 92.3% of segments. For the 7.7% with an identified disagreement, the authors discussed each segment and reviewed criteria until reaching a consensus.

6.6 | Research ethics and limitations

Following ethical guidelines (NESH, 2022), all teachers, students and parents provided written informed consent. A possible limitation is that the design does not capture everything on students' screens unless verbally described. Consequently, we cannot exclude the possibility that some students might have used digital skills at a higher level than was evident in video recordings. However, since this study concerns the use of digital skills in real classroom settings, the design is adequate, as it indicates what aspects of the Framework for digital skills (NDET, 2012) students used or were encouraged to use in classrooms.

7 | FINDINGS

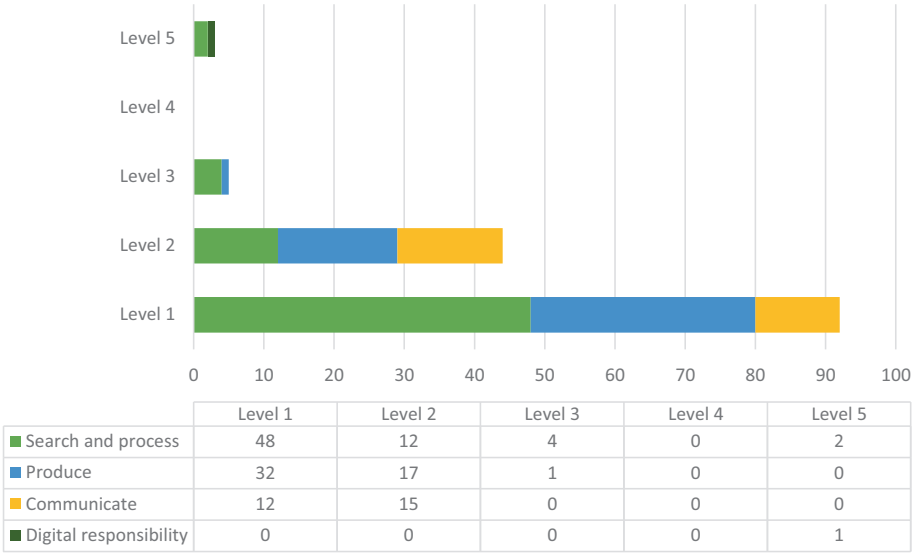
Phase 1 analyses demonstrated that, of this study's 60 video-recorded English lessons, 31 did not include evidence of students' ICT use or digital skills and were thus not included in further analyses. The remaining 29 lessons contained students' digital skill use regarding ICT. To target these uses specifically, we identified 15-minute segments in each lesson involving ICT use—or references to such use—regarding students' digital skills, as described in the Framework for Digital Skills (NDET, 2012). We found 74 segments (74/213; 34.7%) in five of seven schools containing digital skills at a basic or advanced level (S07, S09, S13, S17, S51; see Table 3). These subsections describe students' use of digital skills with illustrative excerpts.

7.1 | Basic rather than advanced digital skills

Phases 2 and 3 of the analysis revealed that, across five schools, 72 segments (72/74; 97%) contained basic digital skills (levels 1 and 2), whereas only seven segments (7/74; 9%) in three schools (S07, S09, S51) contained advanced digital skills (levels 3 and 5). For each

TABLE 3 Distribution of schools, lessons and segments involving ICT activities.

School	Total lessons	Total segments	ICT lessons	ICT segments	Percentage of segments with ICT
S02	6	23	0	0	0
S07	8	39	4	16	41
S09	11	33	8	19	58
S13	8	30	4	6	20
S17	9	28	7	16	57
S50	10	29	0	0	0
S51	8	31	6	17	55
$N = 7$	60	213	29	74	35



	Level 1	Level 2	Level 3	Level 4	Level 5
Search and process	48	12	4	0	2
Produce	32	17	1	0	0
Communicate	12	15	0	0	0
Digital responsibility	0	0	0	0	1

FIGURE 1 Distribution of subskills and levels (1–5) for 74 segments where students used digital skills across 29 English lessons in grades 9 and 10. Since each segment might include more than one subskill, the total exceeds 74.

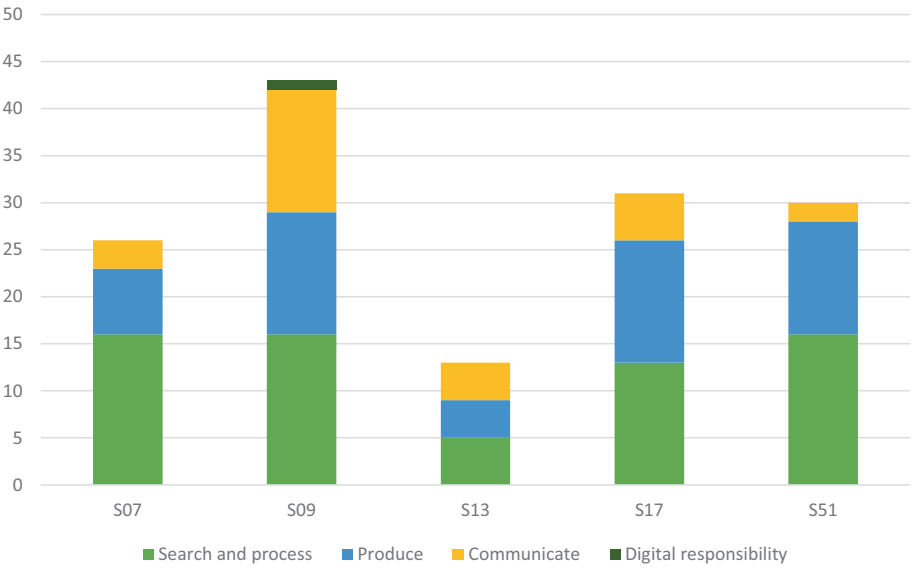


FIGURE 2 Subskill distribution for the five schools displaying digital skills across the 74 segments. Since each segment might include more than one subskill, the total exceeds 74.

segment, we assigned levels across four digital subskills: (1) search and process, (2) produce, (3) communicate and (4) digital responsibility. Figure 1 summarizes the distribution of framework levels for each subskill across all 74 segments targeting ICT-related activities.

Students demonstrated basic digital skills (levels 1 and 2) for three subskills: search and process (60/74 segments), produce (49/74 segments) and communicate (27/74 segments), suggesting these skills belonged to their digital repertoires (cf. Stevenson, 2013) and

teachers frequently provided opportunities for students to use such basic digital skills in real classroom settings. Conversely, students seldom used advanced digital skills (levels 3 and 5); when they did, these involved three subskills: search and process (6/74 segments), produce (1/74 segments) and digital responsibility (1/74 segments).

7.2 | Some digital skills were used more often

In schools where digital skills occurred during English lessons, digital responsibility occurred in one school only (S09). The remaining three subskills were observed in all five schools, although some arose more often (see Figure 2).

Figure 2 depicts that, in each school, the most-used subskills were search and process (37%–61% per school) and produce (27%–42% per school). Digital skills for communication were used less frequently (7%–31% per school) as was digital responsibility (1%; see Transcript 5 for an example). The lack of focus on digital responsibility is concerning considering Norwegian policymakers and schools have emphasized it since 2006 (NME, 2013) and students across all five schools were often asked to find information online to search for and process digital information. Thus, the national curriculum's emphasis on critically reading digital texts and the many tasks asking students to find information suggest this number could be higher. The following subsections elaborate on these subskills.

7.2.1 | Most frequently used digital skill: Search and process

The digital skills students used most frequently across English lessons concerned search and process. They used digital technology to find information as part of their regular English lessons. When they used "simple digital resources and tools for information processing and learning" (Level 2), these practices typically regarded subject-specific content, like English grammar, British literature, or the US presidential election. Although these practices enhanced students' generic digital skills, their use of these skills also promoted students' subject-related work. These skills aligned with competence aims in the English subject curriculum, which stated students should "choose and use content from different sources in a verifiable way" and use "digital resources and other aids [...] in an independent manner in their own language learning" in English (NME, 2013).

However, when students searched for and processed information, they mainly used basic digital skills to read simple interactive information (Level 1) and make simple digital searches (Level 2). In these situations, students generally had little choice whether to use digital technology, which software to use and little emphasis on using multiple digital technologies or more advanced digital skills.

Nonetheless, by following the same classes for consecutive lessons, we observed basic searches sometimes laid the foundation for more advanced searches and processes later in the same and subsequent lessons. These examples included conducting basic searches using digital tools and resources for information processing (Level 3) and using sources in subject-related work (Level 5). Students used more advanced digital skills by conducting internet searches in response to teachers' prompts to do so and on their own, as in this example from a Grade-10 classroom (S07), where students searched for and processed online information concerning the US presidential election (see Figure 3).

When seeking the poll in Figure 3, the teacher modelled how to conduct a search and assess sources critically before students processed information appropriately (Transcript 1):

Later, students used the teacher's modelling to conduct searches in the classroom (Transcript 2) and at home (Transcript 3). In these situations, we observed their digital skills aligning with the description of more advanced skills (Level 3) in the framework for digital skills (see Table 2) because students were actively assessing and using information from digital sources. In one example, a student demonstrated digital skills in searching for online polls and accessing a French webpage

TRANSCRIPT 1 The digital subskill *search and process* (Level 3). School S07, Grade 10.

Teacher: We should actually find a poll of today, shouldn't we? [...] So, we'll Google, and we'll go to the "US election". The English word for *meningsmåling* is "poll". Polls 2016. Today is the fourth of November. [clicks] Telegraph.co.uk. We trust *The Telegraph*. See? Any polls here? Right. What if this task was [sic] given to you in an exam? "Explain what you see on this graph?" It kind of looks like the New York skyline, doesn't it? Tall buildings and then you have the suburban areas. And then here is the Empire State Building, coming up here. Something like that. It looks like a map of New York City. But, what do you...what do you read from this image? This graph?

Student: [...] It has swinged [sic] more as we get closer to the election. [...]

Teacher: It's like a rollercoaster ride, isn't it? Up and down and then a really tall point here. So once Donald Trump is regaining some control, something must have happened to Hillary here. Just like here because she had a big lead, didn't she? Over 50%. That's much [sic].

Student: They really had a lot more polls at the end, because up and down, [...] just at the end there. And you can see that Hillary has lost a...most recently, but just gained a little just at the end there. Trump has...Trump has less votes than Hillary, but sometimes he goes above.

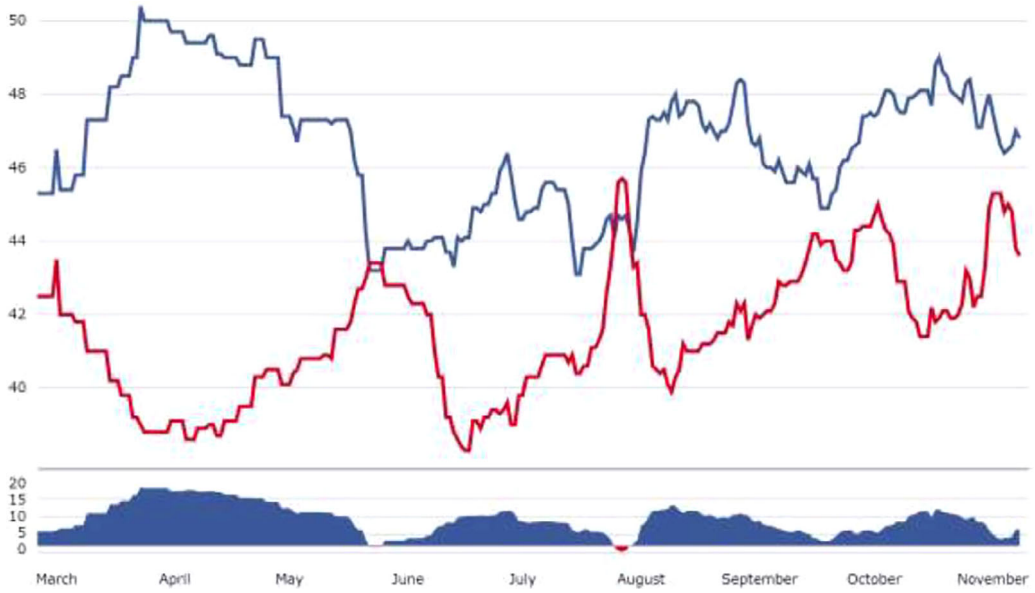


FIGURE 3 US presidential election poll in the telegraph on 4 November 2016. School S07, grade 10

that she considered a good source of information. The webpage was updated every 15 minutes during the election (Transcript 2).

In subsequent English lessons, we identified the use of advanced digital skills (Level 5). Transcript 3 illustrates a student monitoring US election polls at home. The student used advanced search strategies taught earlier in the week to find and update digital information in subject-related work.

Across lessons, transcripts 2–4 suggest students used more advanced digital skills (levels 3 and 5) when they searched for, processed and assessed subject-related information online, both when guided by the teacher and independently. Thus, although students seldom engaged in more advanced search and processing skills, we identified powerful examples of their doing so.

7.2.2 | Digital skill used second most frequently: Produce

Another commonly used digital skill concerns students' production of written texts or presentations. In some classrooms, after searching for and processing information, students produced texts on the same topics on their

TRANSCRIPT 2 **The digital subskill *search and process* (Level 3). School S07, Grade 10.**

Student: Jeg fant en enda bedre side for dette [I found an even better page for this].
Teacher: You found a better page? I like that; send me a link.
Student: Okay.
Teacher: And then I'll put it up on Tuesday, because that's our next English lesson. Because I think that page changes from poll to poll, doesn't it?
Student: Eh, I don't know.
Teacher: It probably does [goes to the student's desk]. Any good page, does that?
Student: Yeah, it's…
Teacher: A French page?
Student: Yeah. […]
Teacher: Right, so you need to translate the French for me, and […] you need to send me a link to that one. Good.

TRANSCRIPT 3 **The digital subskill *search and process* (Level 5). School S07, Grade 10.**

Student 1: Donald Trump har tatt over Ohio nå. [Donald Trump has now taken over Ohio.]
Teacher: Has he? Ooh! Is this almost the same page [on the internet] as I showed you earlier?
Student 1: Det er VG (It is VG, [a Norwegian online newspaper]).
[…]
Teacher: Beware, behold! [Student] has interesting news for us! Do you remember this one where Trump was leading on Tuesday? Well, there's been a change. Trump is leading in one more state. Which state is it?
Student 2: Ohio.
Teacher: Trump is leading Ohio by 0.1%. Trump is in the lead. This might be a clue for us. A Republican president does not become president without winning Ohio. Scary. Interesting.

laptops. Their use of digital skills to produce depended on whether we filmed situations in which students could produce texts during English lessons and whether these texts involved short, fragmented writing, sustained writing assignments or creating PowerPoint presentations.

For example, in one classroom (S51), students were asked to write formulaic answers (e.g., writing key words and short paragraphs) in response to tasks (Level 1). In other classrooms, students could write extended texts in a particular genre. One example was a classroom (S17) where students used laptops to work with literature in Grade 10 to write short reflections on a play and letters to its characters (levels 1–3). In another classroom (S07), we found extensive evidence of digital skills when students used laptops during sustained process-oriented text production. The students wrote argumentative texts about the US presidential election across four video-filmed English lessons, including storing work on their computers. By prompting students to use laptops during these English lessons, the teachers mainly organized conditions to enhance students' basic digital skills (Transcript 4).

7.2.3 | Digital skills used less often: Communicate

Communication skills were observed less frequently in English lessons. When students used digital skills to communicate, it typically concerned oral presentations in the classroom, where they used simple digital tools (e.g., PowerPoint) to present to their teacher and peers. In one classroom (S09), students selected digital tools for brief oral presentations (Level 2). Presenters typically shared PowerPoint presentations on the whiteboard sequentially. Most students listened to presentations without using digital tools, whereas a few students worked individually on their own PowerPoint presentations. Presenters typically used simple digital tools or selected digital tools and media (Level 2) in the classroom, which might be why students' digital skills aligned with levels 1 and 2 in oral presentations. Such use might also be why this sub-skill mainly enhanced students' general digital skills, although they used presentation tools for subject-related presentations.

7.2.4 | Digital skills observed once: Digital responsibility

Despite digital responsibility being highlighted as an important digital skill, there was a striking lack of emphasis on it across videotaped lessons. Only once in the data material did we observe students use digital responsibility to the extent that they commented on it. In this classroom (S09), the teacher and students discussed what to consider when deciding whether to share a film on social media (Transcript 5).

In this dialogue, the student's ethical reflection regarding their role and privacy regulations aligned with a more advanced level of digital responsibility (Level 5) in the Framework for Digital Skills (NDET, 2012).

TRANSCRIPT 4 **The digital subskill *produce* (Level 1). School S07, Grade 10. The teacher prompted students to produce and save a digital text, with evidence of students doing so.**

Teacher: Ok, save your document, give it a good name. […] Save it where you will find it again on Tuesday, and we'll continue writing.

7.3 | Increased use of digital skills over time

Increased use of digital skills between school years (grades 9–10) is expected because students develop these skills. This was particularly noticeable in how Grade 9 students mainly used ICT when teachers instructed them to do so, while Grade 10 students used digital skills,

TRANSCRIPT 5 **The subskill of *digital responsibility* (Level 4). School S09, Grade 9.**

Teacher: The film you showed us […] have you shared it?

Student: Yeah, yes, I've shared it on Facebook, and I've shown it to many of my friends.

Teacher: […] Yes, well, can we just, you say that it is so good that people can share this information through social media?

Student: Yes.

Teacher: But how can we choose [whether to share a film on social media]? Have you thought about that? How do we choose? I think you got the link from your sister, did you? So how do we all find these things? How do we sort the information we get about what he says [in the film] and what are the facts? What's the facts he [Trump] wants to show us? We can't just turn a person around and see the other side of the slogan.

Student: Of course, I think that's…it's important to know your sources and to be sure that they're telling you the truth and not facts that aren't true. Of course, I think that it's… it's important to know your sources and to be sure that they're telling you the truth and not facts that aren't true. But this campaign doesn't say anything directly to him [Trump] and his opinions. It just says something [like], "We're not dangerous", that you know, people, we don't want to provoke danger or harm. We just want to be safe, and they let you know that to come to the United States, they usually they come from Mexico and they're looking for jobs, cause in Mexico it's not very easy to get jobs.

even without prompting to use ICT. Table 4 summarizes English lessons and segments in which digital skills were used each school year.

Table 4 illustrates clear increases in students' observations and digital skills across two school years, using the Framework for Digital Skills (NDET, 2012). Students used digital skills more than twice as often in Grade 10 (52/74 segments; 70%) compared to Grade 9 (22/74 segments; 30%), with large disparities among schools. We observed no ICT lessons at two schools (S02, S50), whereas another two schools engaged in ICT activities less frequently in Grade 10 compared to Grade 9 (S09, S13). Hence, the three remaining schools displayed increased digital skills over time (S07, S17 and S51).

One explanation for the Grade 10 increase seemed connected to the topic. In S07, by following the US presidential election in real time, the teacher provided students the opportunity to use digital skills frequently to search for and process updated information and to write argumentative texts about candidates (see transcripts 1–4). In S17, the teacher provided several opportunities for students to write to literary characters to offer advice about teenage pregnancy and abortion. In S51, the teacher encouraged students to frequently search for and process information, not just provide answers. Another explanation concerns teachers' expectations that students should use digital skills in more advanced ways, as six segments involved advanced digital skills (levels 3 and 5) in Grade 10 (S07, S51) compared to one occurrence (level 5) in Grade 9 (S09; see Transcript 5). We observed one such example in S51 in a student–teacher interaction, where the student offered digital advice to help the teacher choose an adequate operational system for her computer in response to her not finding what she was seeking and her concern about how to proceed.

Finally, Figure 4 reveals how expanded digital skills over time mainly concerned the most frequently used digital skills. Search and produce was observed more than three times as often in Grade 10 (51/74 segments; 69%) compared to Grade 9 (15/74 segments; 20%), while produce was observed almost twice as often in Grade 10 (31/74 segments; 42%) compared to Grade 9 (19/74 segments; 26%). The two remaining skills displayed a slight decrease across school years. Communicate was observed more seldom in Grade 10 (11/74 segments; 15%) compared to Grade 9 (16/74 segments; 22%), whereas digital responsibility was not observed in Grade 10, with one occurrence in Grade 9 (1/74 segments; 1%). Following these classrooms for two school years indicated that although students mainly used basic digital skills (levels 1 and 2), they sometimes could reflect on and discuss practices aligned with more advanced digital skills (levels 3 and 5).

TABLE 4 Distribution of ICT segments across school years

School	ICT lessons	ICT segments	ICT segments grade 9	ICT segments grade 10	Change over time
S02	0	0	0	0	0
S07	4	16	0	16	+
S09	8	19	10	9	−
S13	4	6	4	2	−
S17	7	16	4	12	+
S50	0	0	0	0	0
S51	6	17	4	13	+
$N = 7$	29	74	22	52	

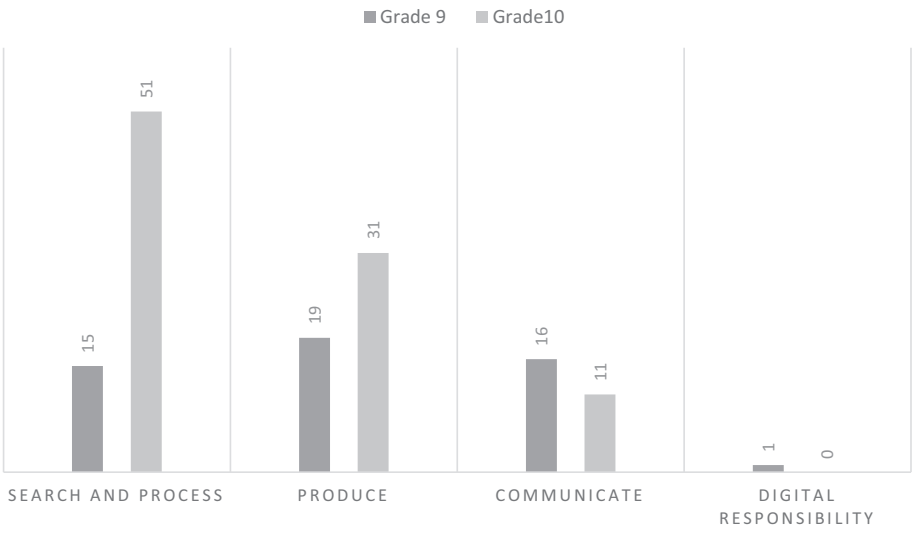


FIGURE 4 Distribution of digital subskills used in 74 segments across 29 English lessons for two school years (grades 9–10). Since each segment might include more than one subskill, the total exceeds 74.

8 | DISCUSSION

Research on using digital technology in the classroom varies considerably in how teachers report using technology in their instruction (Ferrari, 2013; Lund, 2021). While Lund's (2003) study from the early 2000s showed how Norwegian English teachers used ICT to transform and expand teaching practices, more recent studies indicate students' ICT use across subjects is mundane, not innovative (Brevik & Davies, 2016; Gilje et al., 2016).

Our most transparent insight concerns using basic digital skills. Across lessons and school years, digital practices were quite basic, with students utilizing laptops to use programmes prompted by the teachers. Such practices align with video research documenting rather narrow technology use in Norwegian lessons (Blikstad-Balas & Klette, 2020; Brevik & Davies, 2016) and self-reported digital skills (Livingstone et al., 2021). Our study illuminates how digital technology use serves two main purposes in seven secondary English schools in Norway. First, in five of seven schools we video-recorded across two school years, for four to six consecutive English lessons yearly, students demonstrated digital skills in almost half of the filmed lessons and increasingly in the final year. Second, we identified a range of basic digital skills when the teacher asked students to use ICT and when digital skills were not required, but students demonstrated them anyway. Key here was the consistent demonstration of basic digital skills (levels 1–2) for most lessons (97%). Furthermore, students demonstrated more advanced digital skills in activities requiring digital skills like search and process, produce and digital responsibility. These practices mainly aimed to improve students' ability to search for and assess relevant, reliable digital sources and to use information from these sources to produce subject-specific knowledge in English.

The one repeated practice across classrooms was the basic use of digital technology for students' creation of written and oral texts. As mentioned, when students used digital technology to write notes or create PowerPoints for oral presentations or longer written texts (e.g., personal letters and argumentative texts), they did so to develop subject-specific content knowledge in English. The focus was entirely texts' content, not how digital software could augment the writing or revision process, how to create more complex digital texts or how links to texts or properly sourced images could be included in texts. These practices contrast with survey responses indicating digital skills mainly concern digital technology (Livingstone et al., 2021). According to Erstad (2006), even basic use of writing tools, often resembling how people would use an analogue typewriter, should be considered digital skills because they differ from the use of pen and paper for text writing and whiteboard and pen for presentations in that they require different conceptualisations of how to write and communicate. The question of why students must use laptops to create texts remains unanswered across classrooms. Although we could infer the opportunity to revise texts according to the process writing concept constituted the reason, teachers never provided such an explanation. Interestingly, students never questioned or commented on digital technology use, except when asked not to use laptops and, instead, pen and paper for writing. Accordingly, the basic use of digital technology in these English lessons suggests the writing of subject texts was the main purpose, not participation in digital workshops to develop students' digital skills. This might have resulted from the 2006 national curriculum, which introduced the aim of integrating digital skills into all subjects and written exams in English, requiring all students to use a laptop (Erstad et al., 2021; NME, 2013).

Although it is somewhat problematic that most digital skills aligned with Level 1 in the framework for digital skills (NDET, 2012), another notable finding of this study concerns usage of more advanced digital skills. These advanced practices mainly occurred when students searched for trustworthy, up-to-date sources on the internet and when processing information to develop subject-specific content knowledge in English (transcripts 1–3). Our data, which show many English lessons were devoted to searching for and processing information on the internet or the school's learning platform, strengthen the impression that emphasis is placed on developing advanced digital skills in situations involving authentic, current information from the real world. As such, there is a conceptual difference between using basic digital skills when utilizing digital technology in the classroom and advanced digital skills when communicating with society outside the classroom (Voogt et al., 2011; Wu, 2018).

While we highlighted several examples of basic digital skills in our analyses, we found students engaging in more advanced skills. As shown in Table 4, three of four digital subskills aligned with advanced digital skills (levels 3 and 5), although they were used infrequently. The most used advanced skillset in our material was search and process, compared to produce and digital responsibility. In Gran et al. (2019), when students were asked which digital skills were important, they only mentioned online netiquette. In addition, recalling the digital responsibility skill in the Norwegian curriculum (NME, 2013), the fact that our study found only one instance of digital responsibility across classrooms and school years is problematic. Given that we expect students to search for content frequently, it is surprising that teachers in our material did not model, discuss or give tasks on how to assess texts' credibility or asked students to verbalize strategies for judging the trustworthiness of texts more often. Perhaps teachers were more aware of the need to assess texts when finding a new one online. An important implication of this study is that teachers may need to pay even more attention to modelling digital responsibility generally when finding a relevant, authentic text for a lesson.

Even if digital technology, with its functions and applications, can enhance students' digital skills in the classroom and create new facets of language learning, notably, digital technology must be used with pedagogical intentions (Gudmundsdottir & Hatlevik, 2018; Lund, 2003; Tai & Wei, 2021). After all, the subject-specific use of digital skills is important for facilitating students' language learning, not necessarily digital technology. The rationale for why digital skills are considered basic across subjects in the Norwegian curriculum is to enhance the learning not of digital skills themselves, but in and across school subjects. Although students consider ICT crucial for their learning and expect to learn digital tools in school (Gran et al., 2019), students' use of digital skills in the classroom depends on their opportunities for subject-specific use of technology. The increased

digital skills in Grade 10 compared to Grade 9 are relevant. Teachers may wish to ensure a certain level of digital skills before final exams in Grade 10, thereby heightening the focus on them.

Although this study has suggested using more advanced skills can facilitate subject-specific language learning for students, they may not always be perceived as conducive to developing subject-specific digital skills in English. Arguably, students' search for trustworthy sources and updated polls (transcripts 3 and 4) mainly enhanced students' generic skills, although search and process practices facilitated content knowledge relevant to the English subject. Therefore, it is worth studying how participating in classroom digital practices facilitated by technological devices could enhance subject-specific digital skills during English lessons. For this to happen, teachers must have clear ambitions about how and when digital devices can support learning within the subject. Hence, they must go beyond specifying what digital tool to use during which activity. The TALIS report from Norway, using data from 2018, highlights the discrepancy between merely providing access to students and preparing teachers to utilize technology daily (Throndsen et al., 2019). In Norway, the area in which most teachers feel they need more professional development is how to integrate digital skills into their instruction in meaningful ways – again underscoring that moving beyond basic skills can be quite challenging.

The findings contribute to the current literature on technology and digital skills in the language classroom in several ways. Methodologically, this study highlights how adopting the framework for digital skills (NDET, 2012) can help analyse how secondary-school students use digital skills in the English classroom for diverse digital and subject-specific practices (Lund, 2003, 2021). To the best of our knowledge, this is the first time digital skills have been investigated using this framework as an observation protocol to identify the actual use of digital skills in authentic classroom settings. Adopting an existing framework to analyse classroom data helps us highlight how the English classroom can facilitate a technology-mediated space where digital technology could enhance more advanced digital skills. Using the same framework that informs the national curriculum of what digital competence means has high ecological validity and should be directly relevant for practitioners and school leaders.

Notably, using such a framework has limitations. Whenever several categories in an observation system are systematically absent, it is worth questioning whether the framework really captures what is happening in the classroom. Our study had very few borderline cases; the practices we found clearly fit within basic levels. The fact that the framework explicitly verbalizes skills that all students should develop also legitimizes using the framework for observation.

Furthermore, the findings draw attention to the importance of raising English teachers' awareness of disparities between basic and advanced digital skills to encourage them to provide opportunities for both advanced and subject-specific digital skills in the classroom (Erstad et al., 2021). The use of digital skills in English lessons relies on teachers' capacity to use digital tools to develop students' digital skills, which arguably indicates the need to focus on integrating ICT into English teacher education instead of emphasizing a general focus on ICT skill development. Hatlevik et al. (2021) addressed how to adopt effective pedagogies to better use technologies. In studying student teachers' perceptions of digital downsides, teaching tools, self-efficacy, resilience to digital distractions and physical discomfort from using digital technology, they emphasized that "student teachers face both opportunities and challenges in the way they use digital technology and how they are equipped to deliver technology-enhanced teaching and learning" (p. 135). Focusing on how PDC can enhance language learning through digital technology demands more focus in teacher education to develop future teachers' subject-specific PDC to make their competence relevant for classroom use. Additionally, there is a need to emphasize the combination of theoretical knowledge and PDC modelling for student teachers for later classroom implementation (Andreasen et al., 2022; Gudmundsdottir & Hatlevik, 2018).

Finally, this study raises new questions about whether video recordings of classroom instruction capture all digital practices or whether more detailed data, like those captured through screen recordings of students' individual screens, might provide information on more, or more relevant, practices (Beiler et al., 2021), an avenue for further research. Through systematically investigating 60 English lessons in seven lower secondary classrooms in Norway over 2 years, this study supports research arguing digital skills are evident when students use and do not use digital technology. Students may be proficient in these skills, implicitly or explicitly, and transfer this knowledge to other situations without using digital tools. Importantly, the fields of English education and education in general should challenge the rhetoric of infrastructure and the student-per-laptop ratio as key to advancing digital skills and emphasize the need for more advanced digital skills, like reflection and digital responsibility. This is imperative for schools to develop digital skills that are critical for education, inside and outside school.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

PEER REVIEW

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DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

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