Professional Digital Development among Teachers in 1:1 Schools – Skills, Collaboration, and Needs

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Abstract

In recent years, most municipalities in Norway have implemented one digital device per student (1:1) in their public schools. Consequently, teachers must deal with using digital learning technologies in teaching to a far greater extent and more frequently, as the devices are readily available in the classroom. Also, the use of digital tools and teaching practices has accelerated due to periods of homeschooling during the COVID-19 pandemic and has continued in the years after [1]. Teachers must constantly deal with societal developments and new things that are appearing. This paper addresses different perspectives on professional digital development among teachers in primary and secondary schools and is based on a survey conducted in a mid-size Norwegian municipality where all students have a personal digital device. The questions investigated are: How do teachers in 1:1 schools develop their professional digital competence? Which digital activities do they master, and in which areas do they want more expertise? Findings indicate that teachers' personal competence development is done by "trial and error" approaches rather than attending external courses or further education. Nevertheless, the teachers master digital activities such as creating presentations, recording videos, and using collaborative writing tools. While there are fewer that master spreadsheets and tools for block programming. A vast majority express a need for further competence development in topics such as artificial intelligence and programming.

Keywords: *Professional digital development, Digital skills, 1:1 Classrooms.*

1. Introduction

In recent years, most municipalities in Norway have implemented one digital device per student (1:1) in their public schools. Consequently, teachers have to deal with using digital learning technologies in teaching to a far greater extent and more frequently, as the devices are readily available in the classroom. The use of digital tools and teaching practices accelerated due to periods of homeschooling during the COVID-19 pandemic and has continued in the years after [1]. Teachers must constantly deal with societal developments and new things that are appearing. Nowadays, generative AI is the "hot or not" topic in debates about education. The teaching profession cannot solely rely on curriculum-based knowledge but must also master digital developments, whether they are part of their subjects or not, and explore which tools are appropriate for their classes [2,3]. This paper addresses different perspectives on professional digital development among teachers in primary and secondary schools and is based on a survey conducted in a mid-size Norwegian municipality where all students have a personal digital device (N=226; RR=65%). The questions investigated are: How do teachers in 1:1 schools develop their professional digital competence? Which digital activities do they master, and in which areas do they want more expertise? Results and discussion will shed light on which measures should be implemented by local or national school authorities to ensure that teachers have the competence and confidence to keep up with the rapid digital development.

2. Methodology and Sample

The paper presents some findings from a survey conducted among teachers in a medium-sized municipality in 2023. The survey link was distributed to the teachers via email by the principal of each school. The questionnaire batteries are based on previous surveys about digital practices in schools conducted in Norwegian schools. [4]. The survey comprised various components focusing on teachers' digital practices in the classroom, self-assessment of their digital competence, students' digital engagements, and attitudes toward educational technology. The questionnaire predominantly featured statements followed by response options structured on a five-point Likert scale. Additionally,

it included questions with checkboxes and open-ended questions with free-text responses. 226 teachers completed the survey, resulting in a response rate of 65 percent. The teachers work at thirteen schools and across various levels of primary and secondary education (levels 1-10, students aged 6 to 16 years).

3. Results

The findings are presented in three main sections. The first section shows teachers' methods of developing their professional digital competencies. The second section highlights which digital activities teachers are mastering. The final section addresses the future needs for competence development.

3.1 How Teachers Develop Their Professional Digital Competencies

The teachers were asked to select the most important sources (up to 3) for developing their own digital competence. Figure 3.1 presents the various sources of competency development ranked according to the teachers' responses.

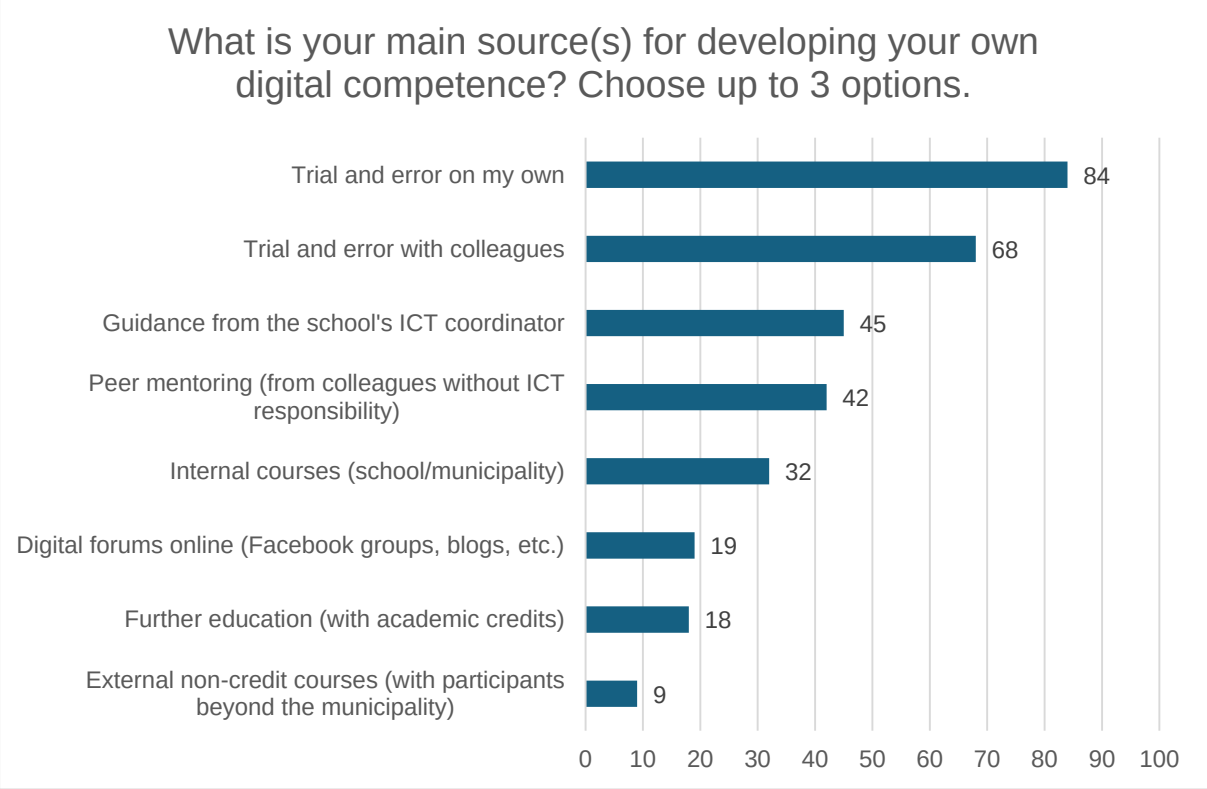

Figure 3.1 Teachers main source of competency development (N=226).

“Trial and error” is the method that the majority of teachers use to develop their own digital competence (84 percent). More than two out of three teachers (68 percent) also indicated “trial and error” with colleagues as an important source of competence development. Furthermore, we observe that guidance from the school's ICT coordinator (45 percent) and peer mentoring (42 percent) are common sources of digital competency development among teachers. One in three mentioned internal courses at the school or municipality as an important source. At the same time, 19 percent stated that online forums were one of their primary sources for competence development. Approximately the same number (18 percent) considered formal further education (with academic credits) as one of their primary sources of developing their digital competence. Nine percent listed external courses with participants beyond the municipality as an essential source of competence development.

3.2 Which Digital Activities Are Teachers Mastering?

Teachers were asked whether they mastered various digital activities related to the national curricula. The three response categories were "yes, without help," "yes, with some help," and "no". Figure 3.2 shows the proportion of teachers who master various digital skills without help from others.

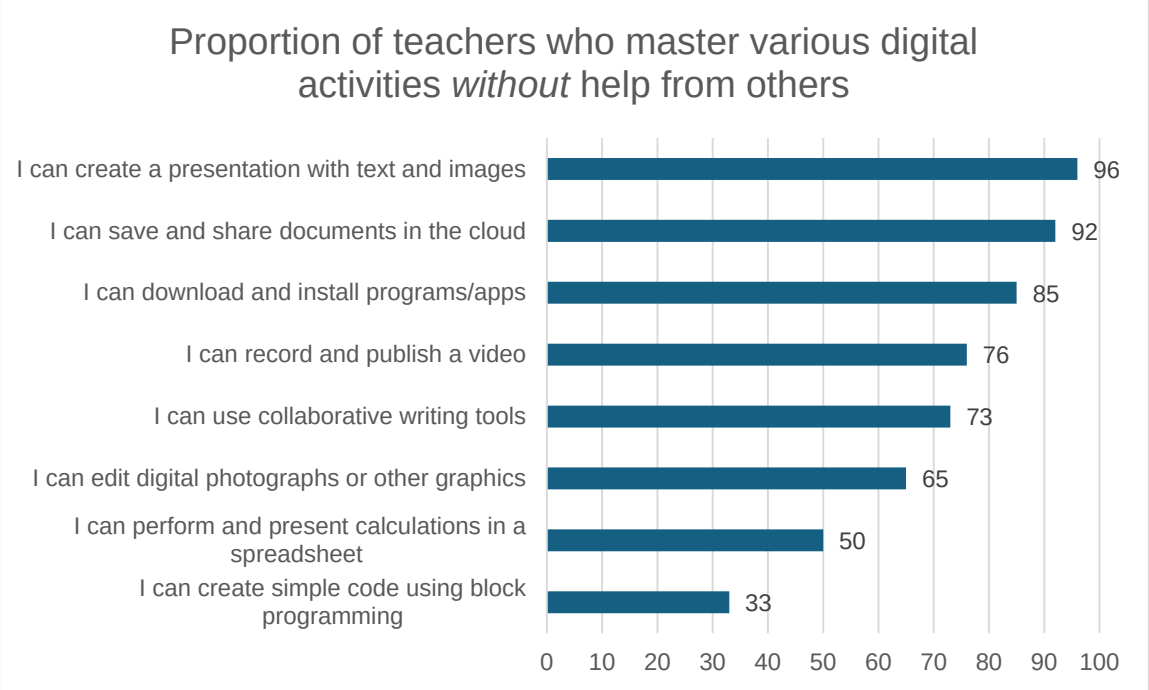

Figure 3.2 Proportion of teachers mastering various digital activities. (N=226).

Most teachers master activities such as creating presentations with text and images (96 percent), saving and sharing documents in cloud-based applications (92 percent), and downloading and installing programs on their computers (85 percent). However, the opportunity to download and install software might differ from school or role, as some might have restrictions on granting teachers admin rights on their work computers. Approximately three out of four teachers say they can record and publish a video (76 percent) and use online collaborative writing tools (73 percent). Half of the teachers can perform and present calculations in a spreadsheet without help (50 percent), and only one out of three know how to create simple codes with block programming (33 percent).

3.3 Future Needs for Competence Development

Based on knowledge from previous research projects and dialogue with various teachers, we compiled a list of areas where we assume many teachers may require further professional digital competence development. The teachers in this survey were asked to indicate all areas in which they had an interest in further competence development. Additionally, they had the option to specify other areas in a free-text field. Figure 3.3 depicts the percentage of teachers in the given municipality who seek competence development within the different areas.

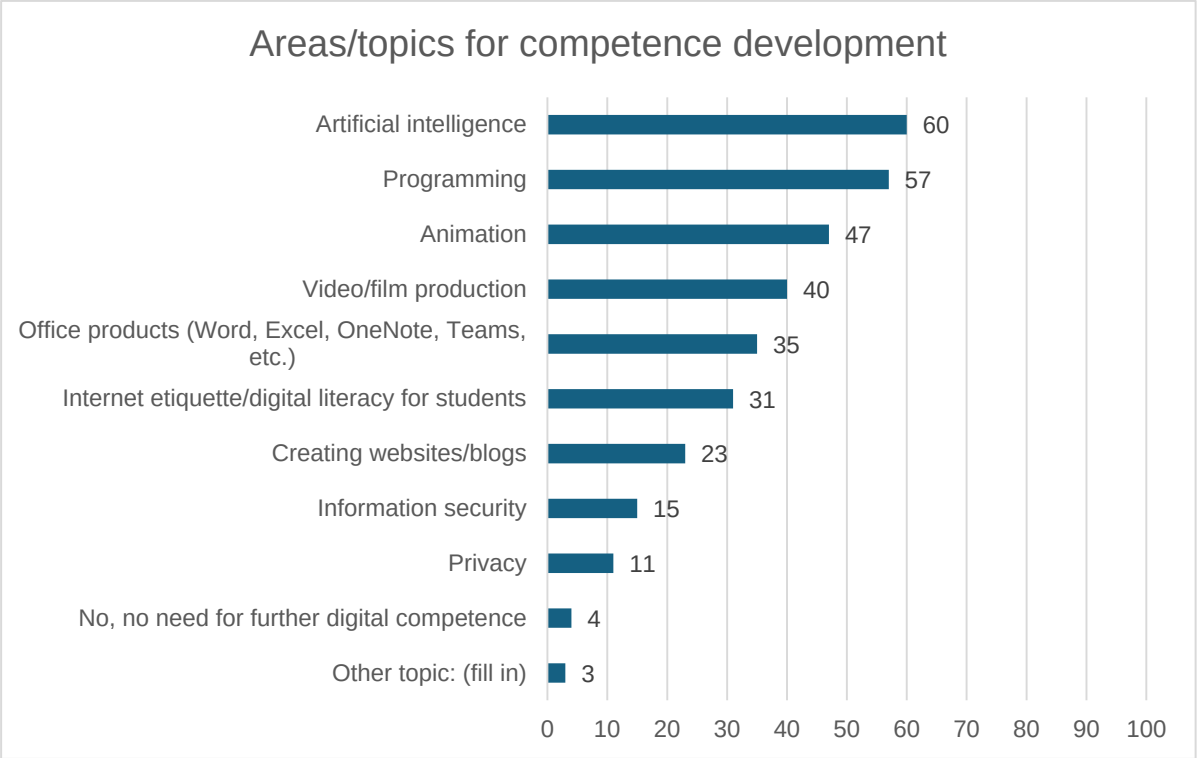

Figure 3.3 Proportion of teachers seeking competence development in various topics (N=226)

Six out of ten teachers express a need for competence development in artificial intelligence and programming. Artificial intelligence has become highly relevant in recent years, largely due to the proliferation of ChatGPT and similar language models. Programming has become more pertinent as coding and algorithmic thinking are highlighted competencies in several subjects in the new national curricula from 2020 [5]. Additionally, a significant proportion of teachers seek more expertise in the creative use of iPads, such as animation (47 percent) and video production (40 percent). Meanwhile, 35 percent indicate a need for more proficiency in Microsoft Office products (e.g., Word, Excel, OneNote, and Teams). Relatively few teachers express a need for competency in privacy (11 percent) and information security (15 percent). A modest percentage (4 percent) express no need for further competence development. Those who responded "other" (7 individuals) listed various apps such as Dragonbox (math), Garageband (music), and Minecraft Education.

4. Discussion and Conclusion

Professional digital development among teachers is a multifaceted process influenced by various approaches and methods. The data reveals that the predominant method for competency development is “trial and error” alone or with colleagues, peer mentoring, and guidance from the ICT coordinator. These approaches underscore the hands-on, experiential nature of teaching and learning. However, it may also be a sign that the schools lack the resources and funding to allow teachers to attend courses or further education. Teachers generally report high levels of proficiency in fundamental tasks such as creating presentations and videos, and using, sharing and collaborating in cloud-based applications. Conversely, more specialized skills such as performing calculations in spreadsheets and creating simple codes with block programming are less commonly mastered. This discrepancy points to potential areas for targeted professional development, especially as these skills have become increasingly relevant in the new curricula. Looking ahead, the need for further competence development is evident in areas such as artificial intelligence and programming, with six out of ten teachers expressing interest in these fields. The rise of technologies like ChatGPT has heightened the relevance of AI, while the curricula implemented in 2020 have driven the demand for algorithmic thinking and programming skills. Despite the high demand for advanced digital skills, relatively few teachers express a need for training in privacy and information security This indicates a potential gap in awareness or prioritization of these critical areas which should be addressed and

prioritized by school authorities. In conclusion, “trial and error” is currently the most common approach but might not be sufficient when dealing with more advanced technologies. A balanced approach that combines experiential learning, peer support, and targeted training in emerging technologies will be essential for teachers to stay proficient and adaptable in the rapidly evolving digital landscape of education.

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