Exploring the Relationship between Digital Competences and Understanding of Informatics Education: A Study on Primary School Teachers

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Abstract. This study investigates the relationship between primary school teachers' digital competencies and their comprehension of the purpose of Informatics education in primary school. The research collected data through online questionnaires from both in-service and pre-service teachers. The results reveal that while many experienced teachers needed help correctly identifying the objectives of Informatics education, a higher percentage of pre-service teachers demonstrated a better understanding. The study highlights a strong link between overall digital competencies and the grasp of Informatics education's purpose among pre-service teachers, underlining the need for targeted training programs.

Keywords: Informatics education· primary education· pre-service and in-service teachers · digital competences· SELFIE for TEACHERS tool.

1 Introduction

The Digital Education Action Plan (2021-2027) [1] identifies Informatics education as one of the priorities to improve digital skills and competences for digital transformation. Overall, Informatics education in primary and secondary schools is crucial for preparing young students for a rapidly evolving digital world and uncertain future [2]. In the renewed curriculum in Lithuania, the introduction of Informatics subjects will start in primary school [3]. The Informatics curriculum for primary schools includes six areas: algorithms and programming; digital content creation; data mining and information; technological problem solving; virtual communication and collaboration, and safe behavior [4].

The European Commission developed a tool called "SELFIE for TEACHERS" to foster the development of teachers' digital competence through self-reflection. The tool is based on the DigCompEdu Framework and is designed to help teachers reflect on and further use digital technologies [5]. The tool consists of 32 statements in six areas. It is an online tool to help primary and secondary teachers learn more about their digital competences and identify areas where they can develop further.

The research aims to determine if there is a relationship between primary school teachers' digital competencies and their understanding of the purpose of

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Informatics education in primary education. This poster presents brief results from in-service and pre-service teachers who participated in the study to get a broader perspective.

2 Method and Participants

The quantitative data were collected via online questionnaires from June 2022 to February 2023. The Pearson correlation test was used to measure the strength of the linear relationship between two variables.

For this study, it was essential to find out how teachers perceive the subject of Informatics in primary education. In renewed curricula [3], the purpose of Informatics is defined in terms of five objectives: (1) to promote the safe and effective use of the various digital communication tools; (2) systematically develop computational thinking; (3) to apply programming knowledge in practice; (4) to improve students' digital skills; (5) to encourage the creative use of digital technologies to solve a wide range of problems. So, teachers were asked to answer the question: "What do you think is the purpose of Informatics education in primary education?". Teachers had to choose all five provided statements to show they understood the purpose of Informatics in primary education.

The "SELFIE for TEACHER" self-assessment tool was used to evaluate teachers' digital competences. Teachers were asked to provide their proficiency levels (A1, A2, B1, B2, C1, and C2) overall and in each of the six areas set with this tool. A1 means the lowest level, and C2 means the best level.

The study involved 17 future primary school teachers (3rd-year students) from Vilnius University. The average age was 22.29 years, with a range of ages from 21 to 30 years. All of them have an opportunity to do a traineeship: 59% in both public and private schools, 35% only in public schools, and 6% only in private schools.

Also, 72 primary education teachers working in primary education in different regions of Lithuania were involved. The average age was 47.78 years, with a range of ages from 22 to 66 years. 50% of teachers have experience teaching Informatics and computational thinking in formal and non-formal education. 36% of respondents are only in formal education, and 11% are only in non-formal education. Only 3% of respondents have no experience teaching Informatics at school.

3 Results

The results show that only 39% (n=28) of in-service teachers correctly chose all five statements describing the purpose of Informatics in primary education. 7% (n=5) of teachers didn't see the link to programming knowledge. 6% of teachers' perception of Informatics is only related to digital technologies. The same other 6% of teachers see no relation to computational thinking and programming.

Meanwhile, 65% (n=11) of the pre-service teachers chose all five statements correctly. 18% of students didn't see the relationship with programming knowledge and chose four statements out of 5.

It is also essential to show which statement describing the purpose of Informatics education must be clarified for teachers. Pre-service teachers and in-service teachers perceived the statement "to apply programming knowledge in practice" as the most related to Informatics education (Fig. 1). It means that during teacher training, we need to pay more attention to programming activities and show teachers how it can be integrated during the lessons. Only 69% of in-service teachers perceived the development of computational thinking skills as part of Informatics education. The results of the collected overall proficiency

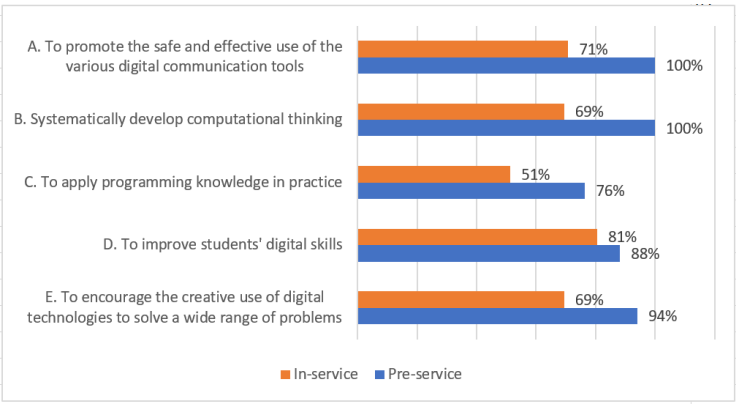

Fig. 1. Percentages of teachers who chose each statement.

levels of digital competences showed that pre-service teachers identified three main levels B1-C2. When comparing within the in-service teacher group, they identified to have main levels A2-B2.

When we compare results in six digital competencies areas, the results show that in the Professional engagement area, pre-service teachers indicated at least level A2, most of which achieved levels B1 and B2. In-service teachers indicated all levels, but mostly B1 (31%). In the second area (Digital Resources), pre-service teachers indicated at least level B1 (18%), and most of them level B2 (53%) as well as C1(24%). In-service teacher group, levels vary from A1 to C2, with most teachers with level A2 (27%), B1 (28%), and B2 (21%). In the areas of Teaching and learning (3rd) and Assessment (4th), the results of in-service teachers were quite similar, with most teachers achieving levels of A2-B2. Pre-service teachers mostly reached the same three levels of digital competences. In the area of Empowering learners, pre-service teachers achieved better results in levels B1-C2, and it can be assumed that they are more ready to engage students actively and include learners with different needs. In the area of Facilitating learners' digital competence, the main level of pre-service teachers was B1 (47%),

while in-service teachers reached mainly A2 (28%) and B1 (25%). Pre-service teachers are more confident in incorporating learning activities by using digital technologies.

In the group of pre-service teachers, the Pearson correlation coefficient of 0.497, observed at the 0.05 level, indicates a strong significant correlation [6] between the variables (level of overall digital competencies and understanding of the purpose of Informatics education in primary education). The Pearson correlation coefficient of 0.233, observed at the 0.05 level, indicates a relatively low degree of significant correlation between the variables in the group of in-service teachers.

4 Conclusion

The results highlight several important findings. Firstly, it was found that only part of in-service teachers (39%) correctly identified all five statements describing the purpose of Informatics education. Some teachers needed to recognize the link between Informatics education and programming knowledge, while others perceived it solely in terms of digital technologies. In contrast, a higher percentage (65%) of pre-service teachers correctly identified all five statements, indicating a potential gap between the training and readiness of future educators compared to their experienced counterparts. Additionally, the analysis of teachers' digital competences revealed variations in proficiency levels among both in-service and pre-service teachers. Pre-service teachers generally demonstrated higher levels of competence, suggesting their readiness to engage students with diverse needs using digital tools. Furthermore, the study established a strong and significant correlation between the overall level of digital competencies and understanding the purpose of Informatics education for pre-service teachers. This indicates that higher digital competency levels are associated with a more comprehensive grasp of the objectives of Informatics education. In contrast, in-service teachers' correlation between these variables was relatively low, potentially indicating a more diverse range of factors influencing their perception.

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