

DIGITAL READINESS OF PROSPECTIVE PRESCHOOL TEACHERS FOR EDUCATIONAL APP INTEGRATION IN EARLY CHILDHOOD EDUCATION

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Abstract: The rising use of digital technologies in early childhood environments stresses the need for the digital literacy of prospective preschool teachers and their positive attitude when integrating educational applications into pedagogical practice. Digitalization is calling for the early childhood education and care (ECEC) professionals to explore the influence of the digital world on children's care and well-being. There has been limited research focused on the digital skills necessary in early childhood education and care, nor on how important it is for the ECEC staff to know in what way digital technologies could be integrated into their work. This study aimed to determine the level of digital literacy of prospective preschool teachers and to find out their attitudes towards the use of educational applications in the area of early and pre-school education. A further aim was to understand the connection between the prospective preschool teachers' perception of their competencies and their readiness to use educational applications. Students from the first to the third year of the undergraduate university study programme of Early and pre-school education were involved in the research. A quantitative research design was used in this study, along with a cross-sectional survey to gather data at one point in time. An online questionnaire was used to examine the level of digital literacy and the attitudes of the students towards the use of the educational application in the early and pre-school education. The statistics of using an e-course related to computer literacy within a Moodle-based system Loomen during their studies were also taken into account. Standardized digital literacy scale and a Likert-type attitudes scale were the main tools for data collection. The latter measured the perception of pedagogical value, usability and the potential risk of educational applications in the work with young children. Descriptive statistics revealed that students' digital literacy was at a moderate to high level, and their attitudes towards the use of educational applications were mainly positive, only concerns expressed in neutral agreement were related to development of social skills and creativity. The results show that prospective preschool teachers, on the whole, consider themselves to be digitally skilled and are inclined to the use of educational applications in early childhood education. However, they also indicate a requirement for the initial preschool teacher programmes to consistently enhance not only their digital competences, but also their critical, pedagogically informed use of technology in preschool practice. The results offer valuable insights that can expand and enhance the preschool teacher study programmes in the era of digital.

Keywords: digital literacy, early childhood education, educational applications, prospective preschool teachers

1. INTRODUCTION

Nowadays, digital technologies are becoming a normal part of the daily lives of young children not only at home but also in institutions. The use of tablets, smartphones and educational applications (apps) is spreading rapidly in early and pre-school education, where they serve as means of storytelling, games, simple coding activities and communication with families. Despite that, research indicate that preschool teachers use digital technologies to a very small extent when working with children of preschool age (Novković Cvetković et al., 2024). In this regard, preschool teachers should figure out the right time and conditions for the use of educational apps in their teaching, thus ensuring that the use of technology is a means of playing and not replacing play-based, developmentally appropriate learning. In order to assume this position, prospective preschool teachers cannot be satisfied with just basic operational skills, enhancing their digital literacy is very important (Wang, 2025, Zhang et al., 2023). They must possess a certain degree of digital literacy which would allow them to look for, judge and choose digital resources in a critical manner, to use educational applications in a pedagogically meaningful way, and also to be conscious of the safety, moral and technology issues that may affect the development and well-being of young children. In this respect, digital literacy involved basic technical skills, the ability to handle information and being able to critically look at digital content and tools. In general, digital literacy refers to the capability of using digital technologies to access, comprehend, evaluate, create and share information (Van Laar et al., 2020). Research finding show that many prospective preschool teachers have strong digital literacy skills, however, their capability to use digital technologies in their practice differs. A study of Öngören (2021) revealed a moderate positive correlation between digital literacy and teaching readiness of 349 prospective preschool teachers which means that a higher level of digital skills would result in greater teaching preparedness.

The study of Diković and Terlević (2025) analyzes digital competence in Croatian preschool teacher education and reveals that 204 course syllabi include digital literacy as a learning outcome, thus emphasizing the role of digital

literacy in learning outcomes. This study adds to raising a level of digital readiness of prospective preschool teachers through the curriculum of their studies. Hiew et al. (2022) research paper assesses the readiness of preschool educators in Malaysia to combine ICT for the Fourth Industrial Revolution. They emphasize preschool educators positive attitudes, high level of ICT skills, and moderate perception of effectiveness, which are indicators of their being prepared for digital integration in education. Similar results show research of Liza and Andriyanti (2020). Results of the Zdanevych et al. (2025) research imply that the educational process can be improved by using the digital technologies.

Nevertheless, the actual use of educational apps in the early and pre-school education is influenced by the teachers' preparation and also their beliefs as well as their feelings towards technology. Students' perception of educational apps, for instance, whether they consider them helpful, distracting, risky, or time-saving will probably determine how much and in what way they will use these tools in their own practice. Positive views can promote the testing and reflective use of these tools, whereas worries about the possible loss of social interaction, creativity or concentration may result in reluctance or limitation of using them. It is becoming more common for initial teacher education programmes to have courses or modules that deal with digital technologies, digital pedagogy, or media education. Still, it remains an open question how well these programmes really provide students with the necessary digital literacy and how they influence students' views of using the educational applications. Most of the previous studies have been done with the focus on in-service teachers, general use of ICT in schools, or digital competence in primary and secondary schools. Research that focuses specifically on future preschool teachers, on educational applications, and on the domain of early and preschool education are still relatively limited. Hence, the knowledge concerning the readiness of prospective preschool teachers to use educational applications in a balanced and pedagogically justified manner in their work with young children is incomplete. This research primarily focuses on the issue about how digitally literate prospective preschool teachers are and what kind of attitudes they have towards the use of educational applications in the field of early and pre-school education. Under the term digital literacy is assumed the ability of the prospective preschool teachers to use digital technologies and resources effectively, safely, and critically and in a way that is relevant to their future professional role. Attitudes can be considered as one's evaluations and beliefs of the educational use, ease of use and possible risks of using such applications with young children. By looking at the two constructs, the research aims to unveil the overall picture of the prospective preschool teacher's digital competence for the use of educational applications in early and pre-school education. So, the primary goals of this work are to determine the level of digital literacy among prospective preschool teachers and secondly to analyze their opinions about the use of educational apps in early and pre-school education. The study intends to offer a brief yet adequately detailed background that facilitates comprehension and assessment of the later finding, and supplies an argumentation groundwork concerning the ways in which initial teacher education may hence be instrumental in the development of digitally competent and pedagogically reflective preschool professionals.

2. MATERIALS AND METHODS

The research utilized a cross-sectional survey design with an online questionnaire. The goal was to find out the extent of digital literacy of the prospective preschool teachers and also to examine their views on the use of educational apps in early and pre-school education. The target population were students enrolled in preschool and early childhood education programmes attending at least one course which was conducted by the support of learning management system (LMS). The study's participants were free to take part in the research and their identities were not recorded. A message inviting them to take part, which also explained the research goal, ethical principles (voluntary participation, anonymity, confidentiality of data) and the estimated time for completing the questionnaire was sent out to them electronically (via institutional email and the learning management system). Questionnaire was formed by Google Forms and link was placed on LMS and shared via e-mails. The total of 127 students accessed the questionnaire but 109 filled it in completely. The data were obtained through an online survey which was divided into three sections. First one related to socio demographic and study related data. The items of this section aimed at providing information on variables such as age, gender, year of study and self-reported frequency of using digital technologies in everyday life and during study. Second section contained closed-ended questions on students' attitudes towards educational apps where they expressed their agreements with provided statements on a five-point Likert scale. Furthermore, digital literacy was measured through a standardized self-report scale (Papap, 2021) specifically aimed at evaluating students' perceived capacity of using digital technology in an efficient and critical manner. The items in the scale covered various facets of digital literacy that were considered significant to the education of the next generation of preschool teachers, like basic operations and technical skills (for instance, the use of devices and software), information skills (finding, evaluating and choosing digital information), communication and collaboration in digital environments, content creation (preparing digital materials, using

multimedia tools), safety and responsible use (privacy, digital footprints, appropriate use with young children). Respondent chose one of the four given statements that is related to them by their opinion (pre-level 1(PL1), level 1, level2 and level3). Before the main data collection, a small group of students from the same population were given the questionnaire to check whether the word use were clear, the length was appropriate and the technical functioning of the online form was good. Changes were made to the questionnaire based on their feedback (rephrasing the items that were ambiguous, and by giving clearer instructions. The reliability of the questionnaire has been checked by the Cronbach's alpha. Data gathering was carried out over a two months period, during the summer academic semester in 2025 To increase the response rate, one or two reminder messages were sent midway through the data-collection period. Upon closure of the survey, responses were exported from the online platform to an excel file and imported to statistical software package Statistica 14.1.0.8 for analysis. Cases with a high proportion of missing data were excluded. Exclusions were made if more than one third of the items were unanswered.

3. RESULTS

Majority of research participants were females (99.1%) which is common occurrence within early and pre-school education studies. Distribution of students according to a year of study can be seen in Table1.

Table 1 Distribution of participants according to a year of study

Year of study	Frequency	Relative frequency
1	39	36%
2	43	39%
3	27	25%
Total	109	100%

Source: Author's research

The analysis of students' digital literacy scale revealed following results (Table 2). Prospective preschool teachers were mostly aware of the possibilities of applying digital technologies in early and preschool education (M=3.13). They found digital technologies important in their everyday life (learning, planning, free time) (M=3.32). In terms of managing technologies for their private and business needs they assessed themselves as independently and capable of using most digital applications (M=3.59). Considering safely managing their digital identity and influence on social media (like Facebook, Instagram, Snapchat, TikTok, LinkedIn) they assessed their abilities moderate (M=3.19). They also assessed their ability to identify risks and implement security measures associated with the use of digital technology (M=3.31). Their willingness to research, test and adopt new technologies has also been assessed in moderate level (M=2.97). They felt confident in managing digital technologies and system (M=3.69).

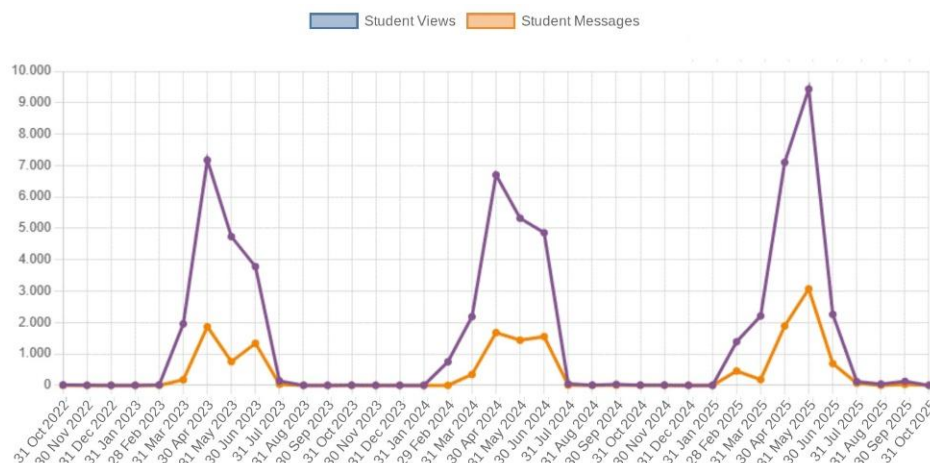
Table 2 Digital literacy components and self-assessed level

Focus Area	Mean	Level (PL1, 1, 2, 3)
Create, connect, communicate and collaborate	3.69	3
Digital identity and safety	3.19	2
Digital technologies and system	3.59	3
Access, organize, present and problem solve	3.31	2

Source: Author's research

By analyzing prospective preschool teachers' activities within LMS system related to course Computer Literacy it can be noticed that their activity has been increased during last three academic years (Figure 1). The range of their activities is related mostly from January till June since the observed e-course is performed during summer semester.

Figure 1 Prospective preschool teachers' activities within LMS (2022-2025)



Source: Report retrieved from LMS (<https://loomen.carnet.hr/>)

Furthermore, prospective preschool teacher attitudes towards using educational applications were also assessed (Table 3). Most of their attitudes towards using educational applications in early and pre-school education were positive. Prospective preschool teachers strongly agreed that using educational apps will help children develop the digital skills they will need in the future and that educational apps can improve children's motivation to learn and explore new topics. They also strongly agreed that technology in educational applications can help children prepare for using technology in school and life and that educational apps enable personalized learning that can better meet the needs of each individual child. However, on the other side, they also expressed their concern related to reducing social interaction among children, as children focus too much on screens as well as disrupting the balance between physical and digital learning, which can affect children's development. They strongly agreed that educational apps should not be the primary learning tool, but only a supplement to traditional methods and that children's attention and concentration can be reduced, because the screen can stimulate them more than the real world. Varied students' perception resulted to more neutral attitudes related to the statements that connect educational apps as a support tool in children's creativity and social skills.

Table 3 Attitudes towards using educational apps in early and pre-school education

Item	Median	Mode	Quartile Range
Using educational apps will help children develop the digital skills they will need in the future.	4	5	2
Educational apps can improve children's motivation to learn and explore new topics.	4	5	2
Using educational apps can enhance children's creativity.	4	3, 4	2
Educational apps can help develop social skills through collaboration and interactive games.	3	5	3
Educational apps enable personalized learning that can better meet the needs of each individual child.	4	5	2
Technology in educational applications can help children prepare for using technology in school and life.	4	5	1
Educational applications make it easier to monitor the progress and individual achievements of children.	4	5	2
The use of educational apps can reduce social interaction among children, as children focus too much on screens.	4	5	1
Technology can disrupt the balance between physical and digital learning, and this can affect children's development.	4	5	1
Educational apps can be useful for developing language and communication skills.	4	4	2
Educational apps should not be the primary learning tool, but only a supplement to traditional methods.	5	5	1
Educational apps can reduce children's attention and concentration, because the screen can stimulate them more than the real world.	4	5	1
The implementation of educational applications in early and preschool education can make educational activities more dynamic and interesting for children.	4	5	2

Source: Author's research

4. DISCUSSION

This research adds to the increasing number of studies about the digital readiness in early childhood education by revealing that prospective preschool teachers generally perceive themselves as digitally competent along with a positive attitude towards the use of educational applications in their future practice. At the same time, their answers indicate that they are careful and consider developmental issues when deciding on the use of educational apps with young children. First, the finding that prospective preschool teachers evaluate their own digital literacy skills as being of a moderate to high level implies that initial teacher education is already providing a solid foundation in terms of the technical and informational skills required. This is consistent with the recent study that suggests that prospective preschool teachers usually claim that they have good digital skills, although their use of these skills for pedagogical purposes is still uneven (Öngören, 2021; Diković & Terlević, 2025). By confirming that prospective preschool teachers are confident in the use of digital systems, are able to manage common applications, and can identify basic digital risks, it thus supports the idea that the main challenge in ECEC is not simple access or the operational skills, but the conversion of these skills into a pedagogically meaningful practice. Lack of preparedness for integrating ICT in future educational practices in preschool confirm research of others (Alelaimat et al. (2020), Masoumi (2021)). Based on the integration of TPACK model and the ecological theory, recent study reveals that the teachers' way of deciding on the use of ICT is dependent on their TPACK, which is eventually determined by the environment around them (Yang & Dong, 2024). Secondly, from the analysis of the pattern of attitudes to educational applications emerges that prospective preschool teachers are quite explicit about the potential of educational apps to help in the area of motivation, personalized learning, language development, and the acquisition of digital skills that are oriented towards the future. At the same time, they openly acknowledge substantial worries about the children socializing, attention, and the ratio of screen time to physical activities. The presence of both positive and cautious opinions is notable, as it indicates that prospective preschool teachers are not just in favor or against the use of technology in the preschool, but rather see the digital tools as a challenge that they have to combine with the fundamental principles of the early childhood education, which are play, relationships and experiential learning. Such a subtle viewpoint can be seen as a part of the broader research which focus on the advantages and the risks of digital technologies in early childhood education. Studies concerning digital competence and the use of ICT in a preschool environment also depict a technical readiness that is on a very high level, whereas the perception of the effectiveness of pedagogy and the appropriateness of the development is more moderate (Hiew et al., 2022; Zdanevych et al., 2025). In this context, the current findings may be seen as one of the proofs that digital readiness in ECEC is a multi-dimensional concept because along with skills and attitudes, it also includes the production of professional judgement about the times when technology is a support and when it can be a barrier to the overall child development. Limitation of the study refer to participants from a single institution, data relying on a self-reported measures and the cross-sectional design of the study.

5. CONCLUSIONS

The study reveals that prospective preschool teachers assess their digital literacy in moderate to high level. Moreover, their attitudes towards the use of educational applications in early and pre-school education are, mostly, positive. Their perceptions also indicate that they are somewhat cautious about the potentially negative effects on children's social skills, attention, and creativity resulting from an overly or improperly use of digital applications. Their basic digital literacy skills should be also expanded with pedagogically based digital competence. This includes support for ability to critically assess educational applications and not just use them arbitrarily. Educational applications should be used when their content corresponds to curricula and play-based approaches, and educators should be very aware of the fact that work with children should be a balanced one which includes both digital and non-digital activities. The combination of both positive attitudes and concerns expressed reveals that prospective preschool teachers recognize educational applications as both a source of opportunities and risk. Future research should incorporate longitudinal designs to portray the evolution of digital readiness of prospective preschool teachers along with the practical application of the readiness in pedagogical practice.

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