Journal Plus Education, ISSN: 1842-077X, E-ISSN (online) 2068 – 1151 Vol XXVII (2020, No. 2, pp . 276-303

# FUTURE PRESCHOOL TEACHERS' ATITUDES ABOUT 21ST-CENTURY DIGITAL SKILLS

**Olivera Cekić-JOVANOVIĆ[a]*;**
**Gordana STEPIĆ[b]**
**and Andrijana MILETIĆ[c]**

**[a]Faculty of Education,University of Kragujevac,Jagodina, Serbia;[b]Preschool Teacher Training and Business Informatics College of Applied Studies – Sirmium, Sremska Mitrovica,Serbia; [c]Faculty of Education,University of Kragujevac,Jagodina, Serbia;**
***o.cekicjovanovic@gmail.com**

**Abstract**: *The study examines the attitudes of future pre-school teachers in preschool institutions about 21st-century digital skills, especially in the field of Methodology of Teaching Environmental Studies. The aim of the research was to examine whether future preschool teahers recognized the possibilities of applying digital technologies in educational work, through self-assessment of digital competencies, and whether there was a statistically significant difference in the attitudes of students of vocational and academic studies. The sample included 125 students, future preschool teachers (57 respondents from vocational studies and 68 respondents from academic studies). The attitudes of students, future preschool teahers, were examined using a five-point Likert-type scale created on the basis of the European Framework for the Digital Competence of Educators. The results of the study showed that future pre-school teachers had positive attitudes and recognized the possibilities of applying digital technology in preschool educational work. Future pre-school teachers positively evaluate their 21st-century digital skills, but in general there is a statistically significant difference in the self-assessment of digital competencies between students of academic and*

*vocational studies, that is, students of academic studies have more positive attitudes about digital competencies compared to students of vocational studies.*

**Keywords**:*preschool teachers*;*European framework for the digital competences; digital competences of educators; key competencies in education for 21st century; pre-school teacher education; methodology of teaching; attitudes of educators; Environmental studies; vocational studies; academic studies.*

## Introduction

A large number of researches dealing with the educational process indicate that it should respond to rapid and dynamic changes, by enabling children to develop skills that will facilitate their lives and work in modern society. Hence, a system of competencies for the 21st century -KC21 (*twenty-first century skills*) - has emerged as an important concept in upbringing and education (Pelegrino & Hilton, 2013, Redeș, 2016). A special place in the series of KC21 competencies belongs to digital competencies, as digital technology has gained an increasingly important place in the lives of children in the 21st century through shaping the way they learn and gain new experiences, spend free time, communicate, play and socialize with peers. Research shows that when used adequately, the use of digital technology in a real program can: support the preschool child's overall development and the development of social and cooperative competencies and children's participation; help in the development of language and mathematical literacy and in the development of "new literacy" or "multi-literacy" (Yelland et al., 2008 according to Pavlović Breneselović, 2014).

The necessity of developing digital competence is implied by the fact that it is one of the eight key competencies for lifelong learning and active participation in society (European Parliament and the Council, 2006; Kojić, Kojić Grandić, & Markov, 2019). Currently, the most commonly used and comprehensive theoretical framework for digital literacy in Europe is The Digital Competence Framework for Citizens, or DigComp. The Digital Competence Framework (DigComp 1.0) was published in 2013 (Ferrari, 2013) and has been revised twice, in 2016 (DigComp 2.0) (Vuorekari et al, 2016) and 2017 (DigComp 2.1) (Carretero et al., 2017). Within DigComp 2.0, five competence areas are defined: information and data literacy, communication and collaboration, digital content creation, safety and problem solving, and within each area there is a list of competencies. While in the second version the conceptual model and terminology were somewhat changed, in the last version the focus was on developing a greater number of

proficiency levels: basic level, intermediate level, advanced level and highly specialized level.

When it comes to educational policy documents, the importance of digital competence is recognized both internationally and nationally. The development of digital competence within the system of compulsory education is prescribed by the Law on the Education System Foundations of the Republic of Serbia and is an integral part of the new Preschool Curriculum Framework "Years of Acent". The Digital Competence Framework - Teacher for a Digital Age (2019) has been created, as one of the measures of educational policy for the development of digital education. This framework can be indirectly used for the development of digital competence of preschool teahers, since it is primarily aimed at teachers and is not harmonized with the new concept of preschool education in the Republic of Serbia. Therefore, we will rely on new documents of educational policy in the field of preschool education.

As the first level in the system of education and upbringing, preschool education achieves the basis for the development of competencies for lifelong learning and thus ensures the continuity of education and lifelong learning (Years of Acent, 2019). Based on the Rulebook on competency standards for the profession of preschool teahers and his professional development, the competence of preschool teahers is determined through three areas: (1) direct work with children; (2) developing cooperation and learning communities; (3) developing professional practice.

The area of "developing professional practice" points out that the preschool teaher should have knowledge about the use of digital technologies. The preschool teahers should be able to: apply and integrate new technologies in the direct educational work; use the advantages, control the disadvantages and dangers of digital technologies and develop awareness and habits in children and parents for an adequate use thereof; use digital technologies in planning activities and designing the necessary materials, in observation, evaluation and documentation; work in various databases (for data records: on children, parents, evaluation, etc.); apply digital technologies for the exchange of information with family, colleagues, associates, local community and other stakeholders and institutions and use digital technologies for professional development. When it comes to the values, it is emphasized that the preschool teahers should have a working etiquette of using digital technologies for the purpose of developing curriculums (the Rulebook on competency standards for the profession of preschool teahers and his professional development, 88/17 and 27/18 – state law).

In this paper, we will look at digital competence in accordance with the theoretical framework provided by the European Commission, according to

which digital competence is a set of knowledge, skills and attitudes necessary when using digital technology to perform various tasks, solve problems, communicate, manage information, collaborate, create and share content and construct knowledge; in an efficient and effective way, critically, creatively, autonomously, adaptively, ethically and reflexively; at work, in free time, for participation in society, learning, socializing (Vuorekari et al., 2016).

Knowledge within the digital competence of pre-school teachers is not reduced to knowledge of technologies and mastering applications, yet knowledge about digital technologies is placed in a broader pedagogical discourse on child's learning and development and creation of a curriculum (Bolst, 2004; Gibbons, 2010; Turvey et al., 2010; Yelland et al., 2008 according to Pavlović Breneselović, 2014). Skills are not built on knowledge about the possibilities that technologies provide for us and on mastering them, but are reflected in the ability to put the possibilities that technologies have in the function of the principles of working with children and their learning and development (Pavlović Breneselović, 2014). Being competent in the field of digital technologies in preschool education means acting professionally, ethically and creatively in educational practice (Ibid, 2014). The question that arises today is not whether digital technology should be integrated into the real program of the preschool institution, but how to support pre-school teachers during professional development, from their initial education onwards, to respond to the demands of the digital age and new educational policy documents.

Research matters of the use of digital technology in preschool education can be classified into four major groups: evaluation of the application of digital technology in preschool institutions (Natsiopoulou & Bletsou, 2011; Masoumi, 2015), the impact of digital technologies on preschool children (Voogt & Mckenney, 2008; Toki & Pange, 2010), opinions and attitudes of pre-school teachers towards the application of digital technology in preschool institutions (Gialamas & Nikolopoulou, 2010; Konca, Ozel & Zelyurt, 2016; Mikelić Preradović, Lešin & Boras, 2017) and the development of digital competence of preschool teahers and its applications in the preschool environment (Kalogiannakis, 2010; Kalaš, 2013, Liu & Pange, 2015; Sillat, Kollom & Tammets, 2017). However, in some papers, these groups of matters are intertwined. The things that are of great importance for our paper are research matters that dealt with the development of digital competence of future pre-school teachers and in-service teachers, as well as with the development of their views on the application of digital technology in educational work.

Since attitudes are relatively permanent systems of positive or negative evaluation, feelings and tendencies to take action for or against, in relation to

different objects, attitudes are tendencies or predispositions of an individual to evaluate an object in a certain way. Attitudes have their own strength, permanence, direction and influence the action of individuals (Trebješanin, 2000). Accordingly, the attitudes of future pre-school teachers can influence their direct activities within the educational work. Positive attitudes of pre-school teachers about the application of digital technology, as well as the development of their digital competencies and effective training have a positive effect on the successful integration of digital technology into the real preschool program (Nikolopoulou & Gialamas, 2009). On the other hand, there are also factors that can negatively affect the application of digital technology in preschool institutions, such as inadequate training, lack of skills and experience, and of course the attitudes of preschool teahers (Sillat, Kollom & Tammets, 2017).

With this in mind, the attitudes of future pre-school teachers about the possibilities of applying digital technology in preschool educational work, as well as their self-assessment of digital competencies, can be an important factor influencing their actions and the application of digital technology in preschool educational work. Therefore, in this research we tried to shed light on and examine the attitudes of future pre-school teachers towards the possibilities of applying digital technology in working with preschool children, through self-assessment of 21st-century digital skills.

When talking about the concept of self- assessment, Vidanović (2006) states that the term self-confidence can be used for this term, which is also defined as a positive evaluation of oneself and belief in one's own abilities and capacities. Self-assessment, as well as other self-reflective activities allow students to assess their own abilities based on clearly defined criteria, in this case digital competencies, but also to receive feedback that should be the starting point in order to improve their work. Some research on digital competencies indicates that teachers who assess that they are digitally competent place greater emphasis on digital literacy of students and have more positive attitudes about the use of digital technologies in educational work (Fraillon et al., 2014; Siddik, F., Scherer,R. & Tondeur, J, 2016)

The self-assessment of digital competencies of pre-school teachers is influenced by numerous factors - age, years of work experience, place of work and education, which is supported by the results of a survey conducted on a sample of 465 respondents. When it comes to age, younger preschool teahers have more developed competencies, but the competencies of pre-school teachers decline with the increase in years of work experience. In the same research, it was concluded that preschool teahers with university degree show better preparedness for the use of modern media in their work than those with secondary education and college degree (Stanisavljević Petrović, Pavlović, 2017).

As preschool children spend most of their time with pre-school teacher who are participants and agents of change, it is important that they use adequate digital technology appropriate to their age, abilities and interests, and that they support and improve the curriculum. If used in a meaningful way, it can be an extremely useful learning tool. Preschool institutions should accept the concept of lifelong learning, follow research on the application of digital technologies in preschool education and, based on their own assessment of practice, improve the quality of educational work.

The role of pre-school teachers is to create an environment in which new technologies are used for research and encouragement (Arsenijević, Andevski, 2012). Based on previous research, "children in Serbia do not sufficiently use the positive aspects of digital technology and have poorly developed digital skills" (Kuzmanović, 2017, according to Kuzmanović, 2019).

If future pre-school teachers - students highly value their own digital competencies, they are expected to feel more competent and ready to use digital technology in educational work. It is also expected that such pre-school teachers will find places for activities through which children's digital competencies are developed.

The aim of the research was to determine whether future pre-school teachers recognized the possibilities of applying digital technologies in educational work with children in preschool institutions, through self-assessment of 21st-century digital skills.

In accordance with the set goal, we dealt with the following research tasks:

(1) Examining the attitudes of students - future pre-school teachers on the possibilities of applying digital technologies in planned learning situations in the field of Environmental Studies.

(2) Examination of the statistical significance of the difference in the self-assessment of digital competencies of future pre-school teachers - students of vocational and academic studies in the field of Methodology of Teaching Environmental Studies.

We decided on the field of Methodology of Teaching Environmental Studies for it is interdisciplinary, integrates various sciences such as biology, physics, chemistry, geography, history, sociology, methodology, pedagogy, developmental psychology, etc. The field of Methodology of Teaching Environmental Studies, due to the complexity of the content it deals with, provides great opportunities for the integration of educational technology both during the preparation and during the implementation of planned learning situations with children in preschool institutions.

## Methods

In accordance with the fact that in Serbia, according to the law, preschool teachers can be educated in two ways:

(1) by studying at vocational studies, that is, at teacher education colleges for a period of 3 years; and

(2) by studying at academic studies, that is, faculty of education for a period of 4 years, the research was conducted at the Faculty of Education and at Colleges of teacher education, during 2019/2020.

Based on previously studied literature and research results in the field of digital competencies and application of educational technology, for the purposes of this research a research instrument was constructed, i.e. an e-form questionnaire in the form of a Likert-type scale which examined the attitudes and self-assessment of digital competence of future preschool teachers. The instrument collected numerical data for the quantitative method of their analysis.

The first part of the questionnaire contained questions for collecting general data and information about the respondents (gender of respondents, achievements in the Methodology of Teaching and the Methodology of Teaching Environmental Studies, name of institutions etc.). The second part was a five-point Likert-type scale, consisting of 26 statements (items).

The statements in the survey questionnaire were formulated on the basis of the *Rulebook on competency standards for the profession of preschool teahers and his professional development* ("RS Official Gazette", No. 88/17 and 27/18), which is based on *DigComp 2.1.* (Carretero, Vuorikari & Punie, 2017).

*Table 1. Statements (items* -IT*) from the research instrument.*

| Code | Definition of items / Formulation of statements |
|---|---|
| T1 | I use e-mail in everyday life and during my studies. |
| T2 | I use WWW - Internet databases in everyday life and during my studies. |
| T3 | I use social networks in my daily life and during my studies. |
| T4 | I have the necessary knowledge and skills to apply digital technologies as a future preschool teacher *to exchange information* with family, colleagues, associates, local community and other stakeholders and institutions. |

| | |
|---|---|
| T5 | I believe that, as a future preschool teacher, I have competencies to *work in various databases* for recording information about children, their parents, evaluation of educational work, etc. |
| T6 | I can successfully use digital technologies to *summarize, compare and consolidate* information from different digital sources. |
| T7 | I am not competent enough to *judge the quality, relevance, accuracy and scope* of digital information. |
| T8 | I successfully use digital technologies in *finding and collecting* relevant information and educational materials for planned learning situations in the field of Environmental Studies. |
| T9 | As a future preschool teacher, I have competencies that enable me to use digital technology in *planning* planned learning situations in the field of Environmental Studies. |
| T10 | I can effectively *adapt, present and methodically transform* digital information and educational materials in accordance with the age of the children and the topic of the planned learning situation in the field of Environmental Studies. |
| T11 | I am able to apply digital tools for organizing and classifying information (chart diagrams, schemes, planners, schedules, mind maps, animations, video tutorials, etc.) in the field of Environmental Studies. |
| T12 | I have the necessary competencies for the use of appropriate digital technologies for *designingandcreating* the necessary educational materials for working with children in the realization of the planned learning situation in the field of Environmental Studies. |
| T13 | I am competent enough to *apply and integrate* digital technologies in the direct educational work, in the realization of the planned learning situation in the field of Environmental Studies. |
| T14 | I can *evaluate and document* various Environmental Studies' activities done with children in preschool institutions in many ways, because I have digital competencies that allow me to create, process and archive photos, digital texts, videos, etc. |
| | I am competent to do *multimedia presentations of content that is interactive* and allows children better understanding as well as easier |

| | |
|---|---|
| T15 | and faster learning in the field of Environmental Studies. |
| T16 | I have digital competencies for the meaningful use of digital technologies as tools that *enable children* to access information during the implementation of the planned learning situation in the field of Environmental Studies. |
| T17 | I am able to use digital technology to enable children to *meaningfully use* digital technologies to express themselves and learn through play within a topic or project in the field of Environmental Studies. |
| T18 | The digital competencies that I have help me to enable children *to use digital technologies themselves for the purpose of monitoring their own learning.* |
| T19 | I am competent to use digital technologies in such a way as to enable children to progress at *their own pace* within the planned learning situations in the field of Environmental Studies, in the way that suits them best. |
| T20 | I am competent to use digital technologies in such a way as to enable children to *make decisions and think critically* within the planned learning situations in the field of Environmental Studies. |
| T21 | I am competent to adequately and safely use the advantages of digital technology in educational work in the field of Environmental Studies. |
| T22 | Adequate attitude and working etiquette of using digital technologies is necessary for every preschool teahers. |
| T23 | I believe that preschool teacher should develop awareness and habits in children and parents for the adequate use of digital technologies. |
| T24 | I believe that as a future preschool teacher I am not competent enough to develop awareness and habits in children and parents for the adequate use of digital technologies. |
| T25 | I believe it is important that digital technology is used for professional development of preschool teacher. |
| T26 | I believe that, as a future preschool teacher, I am not always able to control the shortcomings and dangers of applying digital technology. |

We evaluated the reliability of the questionnaire by calculating the Cronbach' α reliability coefficient which is $\alpha = 0,83$, $\alpha > 0,7$.

### *Research Sample*

The appropriate sample of respondents represents a group of students of the Faculty of Education and Colleges of Teacher Education, which was selected on the basis of the accessibility or expediency. The sample of respondents consisted of N = 125 students, who were students of the third year of vocational and basic academic studies of the study program preschool teacher. 54 respondents were from vocational studies (teacher education colleges) and 61 from basic academic studies (of the study program *Preschool teacher*). All students included in the research have previously successfully completed the course "Methodology of Teaching" (MT). The structure of the respondents is given in Table 2.

*Table 2. Sample structure of respondents*

| Institucion | Gender | | | | Total | | Achievement in Informatic e | Achievement in MT* | Achievement in MTES** |
|---|---|---|---|---|---|---|---|---|---|
| | Female | | Male | | **Σ** | | | | |
| | *f* | % | *f* | % | *f* | % | | | |
| Vocational studies | 54 | 43,2 | 3 | 2,4 | 57 | 45,6 | 7,44 | 8,04 | 8,56 |
| Academic studies | 61 | 48,8 | 7 | 5,6 | 68 | 54,4 | 7,88 | 8,12 | 8,78 |
| | 115 | 92 | 10 | 8 | **125** | 100 | | | |

*MT = Methodology of Teaching

**MTES = Methodology of Teaching Environmental Studies

## Results and Discussion

When it comes to the first research task, the results showed that the majority of respondents (96%, 120 students) had a positive attitude about the possibilities of applying digital technologies in planned learning situations in the field of Environmental Studies. 76% (95 respondents) had a positive attitude and recognized the possibilities of using e-mail and social networks in communication with colleagues, parents and children in order to exchange information. Analogous to the mentioned results, the majority of students (73.6%) recognized the possibility of using digital technologies in such a way as to enable children to make decisions and think critically within the

planned learning situations.Also, 82.4% (103 respondents) recognized the possibility of applying digital technology in working with children by using different databases.

On the other hand, as many as 88.8% (111 respondents) had a positive attitude about the need for permanent professional development of preschool teahers. Respondents within this research (analogous to the results of research with in-service preschool teachers) perceive the level of education and training in the field of ICT as the most important factors influencing *the application* of digital technology in practice (Liu & Pange, 2015). They generally understand the need for additional ICT training as part of their professional development (which is a lifelong process), as well as the importance of motivation in acquiring new skills (Mikelić Preradović, Lešin & Boras, 2017).

Kalogiannakis (2010) indicates that there is a gap between the ICT subjects attended by future preschool teahers at the university and the expected level of ICT use in the preschool environment and points out that a crucial factor for the application of digital technology in preschool institutions is whether future preschool teahers were adequately educated for that purpose during their studies. In accordance with the self-assessment of digital competencies, future preschool teahers, 75% of respondents, agree with the statements and believe that they have the necessary competencies for meaningful use of digital technologies as tools to enable children to access information during the planned learning situations in the field of Environmental studies (which can be somewhat abstracted to other fields). In addition, 59.5% of respondents positively self-assess digital competencies for finding, adapting, organizing and classifying information; designing and creating the required educational materials; summarizing, comparing and combining information from different digital sources of knowledge, as well as evaluating and documenting activities in educational work with children. In accordance with the needs of modern society, it is necessary to follow new trends in curriculum design (Herlo, 2015).

As a special category of digital competencies in the European Framework for the Digital Competence of Educators,*adequate and safe* use of digital technology in the educational system has been singled out. "The dominance of the Internet in the children's world certainly makes it imperative for adults to be active participants in guiding children when using the Internet, in order to provide them with safe and secure access to online content" (Rajić, 2012), and accordingly, within this research, the results showed that 92 (73.6%) future students had a positive attitude about their ability to safely use digital technologies.

On the other hand, close to 45% of respondents believe that they do not have sufficiently developed digital competencies related to the possibility of

successful use of digital technology for *mental engagement and individualization* of children's work, as well as for creating multimedia *interactive* content aimed at better understanding phenomena and processes and at easier and faster learning. On that account, some other studies suggest that the professional development of preschool teahers should be taken into account when considering the use of digital technology in practice (Kerckaert, Vanderlinde, & Braak, 2015), hence, at higher-educational institutions of teacher education, teaching should be directed towards greater / more frequent practical application of digital technology in practice exactly with the aim of improving the quality of educational work.

An interfering factor in the development of digital competencies of preschool teahers and in the application of digital technology in practice can arise in the training of preschool teahers at different levels (initial education, on-the-job training), which offers support for certain digital skills, but little attention is paid to pedagogical analysis of the use of technology in early childhood upbringing and education (Liu, Toki & Pange, 2014). 65% of respondents completely agree, 28% partially agree, and 7% disagree with the fact that digital technology must be used for professional development of preschool teahers (IT25). These results are in line with the results that show that preschool teahers who develop relevant ICT knowledge through continuous professional development can create more opportunities for integrating ICT into everyday activities and jointly develop activities aimed at productive integration of ICT in preschool institutions (Kalaš, 2013).

In order to respond to the second research task and reliably examine the attitudes of students - future preschool teahers about the possibilities of applying digital technologies in planned learning situations in the field of Environmental Studies and determine whether there is a statistically significant difference in self-assessment of digital competencies of students of vocational and academic studies, we analyzed the uniformity of the groups according to:

(1)gender of respondents;

(2) achievements in the IT group of subjects, as relevant areas for the development of digital competencies of future preschool teahers;

(3) Methodology of teaching, as relevant areas for the application of appropriate methodological procedures along with the use of educational technology in working with children in preschool institutions; and

(4) Methodology of Teaching Environmental Studies, as an interdisciplinary subject that offers numerous opportunities for the application of educational technology in direct work with children in preschool institutions.

When calculating the normality of the data distribution, the result of the Kolmogorov-Smirnov normality test was used, since the sample of respondents was larger than 50, **N=125**.

*Tabela 3. Normality test – Data distribution*

| | **Grupa ispitanika** | **Kolmogorov-Smirnov** | | |
|---|---|---|---|---|
| | | **Statistic** | **df** | **Sig.** |
| **Gender of respondents** | Vocational studies**(VS)** | 0,540 | 57 | **0,000** |
| | Academic studies **(AS)** | 0,529 | 68 | **0,000** |
| **Achievement in Informatice** | **VS** | 0,195 | 57 | **0,000** |
| | **AS** | 0,179 | 68 | **0,000** |
| **Achievement in Methodology of Teaching** | **VS** | 0,181 | 57 | **0,000** |
| | **AS** | 0,172 | 68 | **0,000** |
| **Achievement in Methodology of Teaching Environmental Studies** | **VS** | 0,241 | 57 | **0,000** |
| | **AS** | 0,196 | 68 | **0,000** |

Significance is everywhere less than 0.05 (p = 0.000 in all cases), the results do not have a normal distribution, which leads us to further use the Mann-Whitney test to calculate the statistical significance of the difference between the group of students from academic studies and vocational studies.

*Table 4. Student achievements in Informatics, Methodology of Teaching and Environmental Studies Methodology*

| | **Group** | **Median** | **Mean Ranks** | **Sum of Ranks** | **Kolmogorov-Smirnov test** | **Mann-Whitney test** |
|---|---|---|---|---|---|---|

| | | | | | Statistic | Sig. | U | Z | Sig. |
|---|---|---|---|---|---|---|---|---|---|
| **Informatice** | **FG** | 8,00 | 59,60 | 3397,00 | 0,540 | 0,000 | 1744 | -0,986 | **0,324** |
| | **SG** | 8,00 | 65,85 | 4478,00 | 0,529 | 0,000 | | | |
| **Methodology of Teaching** | **FG** | 8,00 | 61,20 | 3488,50 | 0,195 | 0,000 | 1835,5 | -0,522 | **0,602** |
| | **SG** | 8,00 | 64,51 | 4386,50 | 0,179 | 0,000 | | | |
| **Methodology of Teaching Environmental Studies** | **FG** | 9,00 | 59,73 | 3404,50 | 0,181 | 0,000 | 1751,5 | -0,965 | **0,335** |
| | **SG** | 9,00 | 65,74 | 4470,50 | 0,172 | 0,000 | | | |

Significance is higher than 0.05 everywhere (p = 0.304; 0.324; 0.602; 0.335), which means that the groups are uniform according to gender, achievements in the IT subjects, achievements in the Methodology of Teaching and in the Methodology of Teaching Environmental Studies.

After examining the uniformity of groups, we were interested in whether there was a statistically significant difference in students' attitudes about the possibilities of applying digital technology in educational work, and in the self-assessment of digital competencies of these two groups of students (students of academic and vocational studies).

The results showed that there was a statistically significant difference in the self-assessment of digital competencies of future preschool teahers who are taking academic studies in relation to students of vocational studies. The grades which preschool teahers in vocational studies (VG) used to assess their digital competencies differ significantly from the grades of preschool teahers in academic studies (AG). When comparing the results for each individual item, we found that there was a statistically significant difference between AG and VG within 13 of the 26 items.

*Table 5. Self-assessment of digital competencies of students of vocational and academic studies.*

| **Items** | **Group** | **Median** | **Mean Ranks** | **Sum of Ranks** | **Kolmogorov-Smirnov test** | **Mann-Whitney test** |
|---|---|---|---|---|---|---|

| | | | | | Statistic | Sig. | U | Z | Sig. |
|---|---|---|---|---|---|---|---|---|---|
| IT1 | FG | 4,00 | 73,23 | 4174,00 | 0,451 | 0,000 | 1355,00 | -3,375 | **0,001** |
| | SG | 5,00 | 54,43 | 3701,00 | 0,271 | 0,000 | | | |
| IT2 | FG | 5,00 | 61,16 | 3486,00 | 0,357 | 0,000 | 1833,00 | -0,627 | 0,531 |
| | SG | 5,00 | 64,54 | 4389,00 | 0,394 | 0,000 | | | |
| IT3 | FG | 5,00 | 59,11 | 3369,00 | 0,455 | 0,000 | 1716,00 | -1,697 | 0.090 |
| | SG | 5,00 | 66,26 | 4506,00 | 0,524 | 0,000 | | | |
| IT4 | FG | 5,00 | 69,39 | 3955,00 | 0,428 | 0,000 | 1574,00 | -2,086 | **0.037** |
| | SG | 5,00 | 57,65 | 3920,00 | 0,325 | 0,000 | | | |
| IT5 | FG | 4,00 | 74,84 | 4266,00 | 0,434 | 0,000 | 1263,00 | -3,753 | **0,000** |
| | SG | 5,00 | 53,07 | 3609,00 | 0,250 | 0,000 | | | |
| IT6 | FG | 4,00 | 68,66 | 3913,50 | 0,358 | 0,000 | 1615,50 | -1,784 | 0,074 |
| | SG | 5,00 | 58,26 | 3961,50 | 0,274 | 0,000 | | | |
| IT7 | FG | 3,00 | 70,91 | 4042,00 | 0,216 | 0,000 | 1487,00 | -2, 325 | **0,020** |
| | SG | 3,00 | 56,37 | 3833,00 | 0,187 | 0,000 | | | |
| IT8 | FG | 4,00 | 67,18 | 3829,00 | 0,364 | 0,000 | 1700,00 | -1,322 | 0,186 |
| | SG | 5,00 | 59,50 | 4046,00 | 0,261 | 0,000 | | | |
| IT9 | FG | 4,00 | 67,93 | 3872,00 | 0,318 | 0,000 | 1657,00 | -1,507 | 0,132 |
| | SG | 5,00 | 58,87 | 4003,00 | 0,235 | 0,000 | | | |
| IT10 | FG | 4,00 | 70,40 | 4013,00 | 0,306 | 0,000 | 1516,00 | -2,384 | **0,017** |
| | SG | 4,00 | 56,79 | 3862,00 | 0,318 | 0,000 | | | |
| IT1 | FG | 4,00 | 71,45 | 4072,50 | 0,235 | 0,000 | 1456,50 | -2,545 | **0,011** |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | SG | 4,00 | 55,92 | 3802,50 | 0,227 | 0,000 | | | |
| IT12 | FG | 4,00 | 67,54 | 3849,50 | 0,286 | 0,000 | 1679,50 | -1,407 | 0,159 |
| | SG | 4,00 | 59,20 | 4025,50 | 0,267 | 0,000 | | | |
| IT13 | FG | 4,00 | 70,30 | 4007,00 | 0,268 | 0,000 | 1522,00 | -2,232 | **0,026** |
| | SG | 4,00 | 56,88 | 3868,00 | 0,251 | 0,000 | | | |
| IT14 | FG | 4,00 | 66,26 | 3777,00 | 0,341 | 0,000 | 1752,00 | -1,056 | 0,291 |
| | SG | 4,00 | 60,26 | 4098,00 | 0,305 | 0,000 | | | |
| IT15 | FG | 4,00 | 72,75 | 4147,00 | 0,371 | 0,000 | 1382,00 | -3,036 | **0,002** |
| | SG | 5,00 | 54,82 | 3728,00 | 0,274 | 0,000 | | | |
| IT16 | FG | 4,00 | 68,79 | 3921,00 | 0,392 | 0,000 | 1608,00 | -2,041 | **0,041** |
| | SG | 4,00 | 58,15 | 3954,00 | 0,377 | 0,000 | | | |
| IT17 | FG | 4,00 | 67,89 | 3870,00 | 0,306 | 0,000 | 1659,00 | -1,553 | 0,120 |
| | SG | 4,00 | 58,90 | 4005,00 | 0,298 | 0,000 | | | |
| IT18 | FG | 4,00 | 70,91 | 4042,00 | 0,283 | 0,000 | 1487,00 | -2,468 | **0,014** |
| | SG | 4,00 | 56,37 | 3833,00 | 0,342 | 0,000 | | | |
| IT19 | FG | 4,00 | 69,84 | 3981,00 | 0,260 | 0,000 | 1548,00 | -2,143 | **0,032** |
| | SG | 4,00 | 57,26 | 3894,00 | 0,298 | 0,000 | | | |
| IT20 | FG | 4,00 | 70,78 | 4034,50 | 0,240 | 0,000 | 1794,50 | -2,382 | **0,017** |
| | SG | 4,00 | 56,48 | 3840,50 | 0,272 | 0,000 | | | |
| IT21 | FG | 4,00 | 68,66 | 3913,50 | 0,300 | 0,000 | 1615,50 | -1,742 | 0,082 |
| | SG | 4,00 | 58,26 | 3961,50 | 0,243 | 0,000 | | | |
| IT22 | FG | 5,00 | 63,73 | 3632,50 | 0,311 | 0,000 | 1896,50 | -0,231 | 0,817 |
| | SG | 5,00 | 62,39 | 4242,50 | 0,311 | 0,000 | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| IT23 | | FG | 4,00 | 59,68 | 3401,50 | 0,257 | 0,000 | 1748,50 | -1,002 | 0,316 |
| | | SG | 4,00 | 65,79 | 4473,50 | 0,253 | 0,000 | | | |
| IT24 | | FG | 2,00 | 69,77 | 3977,00 | 0,265 | 0,000 | 1552,00 | -1,987 | **0,047** |
| | | SG | 3,00 | 57,32 | 3898,00 | 0,227 | 0,000 | | | |
| IT25 | | FG | 4,00 | 65,19 | 3716,00 | 0,311 | 0,000 | 1813,00 | -0,682 | 0,495 |
| | | SG | 5,00 | 61,16 | 4159,00 | 0,267 | 0,000 | | | |
| IT26 | | FG | 4,00 | 67,07 | 3823,00 | 0,290 | 0,000 | 1706,00 | -1,216 | 0,224 |
| | | SG | 4,00 | 59,59 | 4052,00 | 0,293 | 0,000 | | | |
| Total score | | FG | 103,5 | 74,46 | 4244,00 | 0,076 | 0,200 | 1285,00 | -3,239 | **0,001** |
| | | SG | 111,0 | 53,40 | 3631,00 | 0,141 | 0,006 | | | |

There is a statistically significant difference in the attitudes of students of vocational and academic studies when it comes to statements IT1, IT4, IT5, IT7, IT10, IT11, IT13, IT15, IT16, IT18, IT19, IT20, IT24. In relation to students of vocational studies, students of academic studies have more positive attitudes about digital competencies related to: the use of e-mail in communication; exchange of information with family, colleagues, associates, local community and other stakeholders and institutions; work in different databases; judging the quality, relevance, accuracy and scope of digital information; adaptation, presentation and methodological transformation of digital information; application of digital tools for organization and classification of information; application and integration of digital technology in the direct educational work; multimedia presentation of interactive content; digital competencies for meaningful use of digital technologies as tools that enable children to access information during the implementation of the planned learning situations in the field of Environmental Studies; independent use of digital technology by children in monitoring their own learning; the use of digital technologies so as to enable children to progress at their own pace within the planned learning situations in the field of Environmental Studies, in the way that suits them best; the use of digital technologies so as to enable children to make decisions and think critically within the planned learning situations in the field of Environmental Studies; development of awareness and habits in children and parents for the

adequate use of digital technologies. The development of digital competence of future preschool teahers should be based on didactics, pedagogical knowledge and practical application in the context of preschool institutions. Future preschool teahers believe that practice is an important part in shaping digital competence and point out that the application of theoretical knowledge in practice has enabled them to become confident in their competencies (Sillat, Kollom & Tammets, 2017).

On the other hand, the results show that there is no statistically significant difference in the attitudes of students of vocational and academic studies when it comes to statements IT2, IT3, IT6, IT8, IT9, IT12, IT14, IT17, IT21, IT22, IT23, IT25, IT26. In these cases, the significance is higher than 0.05 everywhere ($p>0.05$). Both groups of students have equally positive attitudes and believe that they have digital competencies related to: the use of Internet databases and social networks during their studies; finding and collecting relevant information and educational materials; planning learning situations in the field of Environmental Studies; designing and creating the required educational materials for working with children in the implementation of the planned learning situations in the field of Environmental Studies; summarizing, comparing and combining information from different digital sources of knowledge; evaluation and documentation of activities in educational work with children; meaningful use of digital technology to express and learn through play within a topic or project in the field of Environmental Studies; adequate and safe use of digital technology in educational work in the field of Environmental Studies; adequate attitude and working etiquette of using digital technologies; developing awareness and habits in children and parents for the adequate use of digital technologies; professional development of preschool teahers and control of the shortcomings and dangers of the application of digital technology. The results of this part of the research are in accordance with the results of studies related to the development of digital competence of preschool teahers and the application of digital technology in the preschool institutions environment (Kalogiannakis, 2010; Kalaš, 2013, Liu & Pange, 2015; Sillat, Kollom & Tammets, 2017).

## Conclusion

The study results showed that future preschool teahers had positive attitudes and recognized the possibilities of applying digital technology in educational work. These results are encouraging, in the sense that attitudes can provoke certain desirable actions, assuming that future preschool teahers who have positive attitudes about the application of digital technology in educational work and positively assess their digital competencies will more

often apply digital technology in practice in order to improve its quality. Future preschool teahers positively evaluate their 21st-century digital skills, but in general there is a statistically significant difference in the self-assessment of digital competencies between students of academic and vocational studies, that is, students of academic studies have more positive attitudes about digital competencies compared to students of vocational studies.

The reasons for such results can be found in the sample size, which is relatively small, then in the various structures of study programs in vocational and academic studies for teacher education, and in the number of subjects within which digital technology can be applied in direct educational work with children in preschool institutions. There is a possibility that under different, more strictly controlled conditions and a larger sample, the obtained results would be significantly different. In addition, it would be good to further examine the factors that influenced such research results, and accordingly improve the structure of study programs and teaching within the initial education of future preschool teahers (both in academic and vocational studies). Certainly, training programs for future preschool teahers should be designed and implemented in such a way as to enable the development of a scientific view and positive attitudes towards digital technology (Gialamas & Nikolopoulou, 2010).

Acknowledgements: This article is a result of the bilateral cooperation project titled Assumptions and possibilities of developing innovative models of teaching for accomplishing transparency of university education and for raising competitiveness in national and international knowledge markets, realized and financied by the University of Kragujevac, Faculty of Education, Jagodina (Republic of Serbia), and the University of Primorska, Faculty of Education, Koper (Republic of Slovenia), in the period 2017-2019.

## References

Carretero, S., Vuorikari, R. & Punie, Y. (2017). *DigComp 2.1: The Digital Competence Framework for Citizens with eight proficiency levels and examples of use*, EUR 28558 EN, doi:10.2760/38842.

European Parliament and the Council of the European Union (2006). Recommendation of the European Parliament and of the Council of 18 December 2006 on key competences for lifelong learning. *Official Journal of the European Union*, L394/10.

Ferrari, A. (2013). DIGCOMP: *A Framework for Developing and Understanding Digital Competence in Europe*. Seville: JRC-IPTS.

Gialamas, V., &Nikolopoulou, K. (2010). In-service and pre-service early childhood teachers' views and intentions about ICT use in early childhood settings: A comparative study. *Computers & Education*, 55, 333–341.

*Godineuzleta, Osnoveprogramapredškolskogvaspitanja i obrazovanj*a (2019). Beograd:Prosvetnipregled d.o.o.

Herlo, D. (2015). New trends in curriculum design process for higher education. *Journal Plus Education*, 12 (2), 36-41.

Kalaš, I. (2013). Integration of ICT in Early Childhood Education. In N. Reynolds & M. Webb (Eds.), *Proceedings of the 10th World Conference on Computers in Education* (pp. 217-225). Torun, Poland: IFIP.

Kalogiannakis, M. (2010). Training with ICT for ICT from the Trainer's Perspective. A Local ICT Teacher Training Experience. *Education and Information Technologies*, 15 (1), 3–17.

Kerckaert, S., Vanderlinde, R. &Braak, J. (2015). The role of ICT in early childhood education: Scale development and research on ICT use and influencing factors. European Early *Childhood Education Research Journal*, 23 (2), 183-199. doi: 10.1080/1350293X.2015.1016804

Kojić, M., KojićGrandić, S. & Markov, Z. (2019). The professional advanced training of educational workers by means of e-learning and lifelong learning. *Journal Plus Education*, XXII (1), 88-98.

Konca, A. S., Ozel, E. &Zelyurt, H. (2016). Attitudes of preschool teachers towards using information and communication technologies (ICT). *International Journal of Research in Education and Science* (IJRES), 2(1), 10-15.

Liu, X. &Pange, J. (2015). Early Childhood Teachers‟ Access to and Use of ICT in Teaching: The Case of Mainland China. *Proceedings of Global Learn 2015* (pp. 590-596). Berlin, Germany: Association for the Advancement of Computing in Education (AACE).

Marsh, J., Kontovourki, S. Tafa, E. &Salomaa, S. (2017). *Developing Digital Literacy in Early Years Settings: Professional Development Needs for Practitioners*. A White Paper for COST Action IS1410.

Masoumi, D. (2015). Preschool Teachers' use of ICTs : Towards a typology of practice. *Contemporary Issues in Early Childhood*, 16 (1), 5-17. doi: 10.1177/1463949114566753.

MikelićPreradović, N. Lešin, G. & Boras, D. (2017). The Role and Attitudes of Kindergarten Educators in ICT-Supported Early Childhood Education. *TEM Journal*. 6 (1), 162-172. DOI: 10.18421/TEM61-24.

Natsiopoulou, T., &Bletsou, M. (2011). Greek preschoolers' use of electronic media and their preferences for media or books. *International Journal of Caring Sciences*, 4(2), 94-104.

Nikolopoulou, K., &Gialamas, V. (2009). Investigating pre-service early childhood teachers' views and intentions about integrating and using computers in early childhood settings: compilation of an instrument. *Technology, Pedagogy and Education*, (18) 2, 201-219.

*Okvirdigitalnihkompetencija – Nastavnikzadigitalnodoba* (2019). Beograd: Zavodzaunapređenjeobrazovanja i vaspitanja, Ministrastvoprosvete, nauke i tehnološkograzvoja i Zavodzavrednovanjekvalitetaobrazovanja i vaspitanja.

PavlovićBreneselović, D. (2014). Kompetencijevaspitačazakorišćenje IKT u predškolskomprogramu: višeodveštine. Retrived May 2, 2020 from the http://www.ftn.kg.ac.rs/konferencije/tio2014/PDF/603%20Pavlovic-Breneselovic.pdf

Pellegrino, J. W. & Hilton, M.L. (2013). *Education for Life and Work: Developing Transferable Knowledge and Skills in the 21st Century*. Washington DC: National Academy of Sciences.

*Pravilnik o standardimakompetencija za profesijuvaspitača i njegovogprofesionalnograzvoja.* Službeniglasnik RS, br. 88/17 i 27/18 – dr. zakon.

Rajić, S. (2012). Bezbednostdecenainternetuidruštvenimmrežama, *Inovacijeunastavi*, 25 (2), 69 - 79.

Redeș, A. (2016). The development of students key competences and transversal skills throught practice teaching activities. *Journal Plus Education*, 15, 231-239.

Sillat, L.H., Kollom, K. &Tammets, K. (2017). Development of digital competencies in preschool teacher training. In: L. Gómez Chova, A. López Martínez, I. CandelTorres (Eds). *9th International Conference on Education and New Learning Technologies*, (pp. 1806-1813). Barcelona: IATED Academy. DOI: 10.21125/edulearn.2017.1382.

Toki, E. I., &Pange, J. (2010). E-learning activities for articulation in speech language therapy and learning for preschool children. *Procedia Social and Behavioral Sciences*, 2, 4274–4278.

Требјешанин, Ж. (2000). *Речник психологије*, Београд: Стубови културе.

Voogt, J., &Mckenney, S. (2008). Using ICT to foster (pre)reading and writing skills in young children. *Computer in the Schools*, 24(3-4), 83-94

Vuorikari, R., Punie, Y., Carretero Gomez S., Van den Brande, G. (2016). *DigComp 2.0: The Digital Competence Framework for Citizens. Update Phase 1: The Conceptual Reference Model*. Luxembourg Publication Office of the European Union. EUR 27948 EN. doi:10.2791/11517.

Xia, L., Toki, E. I., and Pange, J. (2014). The Use of ICT in Preschool Education in Greece and China: A Comparative Study. *Procedia - Social and Behavioral Sciences*, Vol. 112, 1167 – 1176.

*Zakon o osnovamasistemaobrazovanja i vaspitanja*. Službeniglasnik RS, br. 88/2017, 27/2018 - dr. zakon, 10/2019, 27/2018 - dr. zakon i 6/2020.

Separate tables.

Table 1. Statements (items - IT) from the research instrument.

| Code | Definition of items / Formulation of statements |
|---|---|
| IT1 | I use e-mail in everyday life and during my studies. |
| IT2 | I use WWW - Internet databases in everyday life and during my studies. |
| IT3 | I use social networks in my daily life and during my studies. |
| IT4 | I have the necessary knowledge and skills to apply digital technologies as a future preschool teacher *to exchange information* with family, colleagues, associates, local community and other stakeholders and institutions. |
| IT5 | I believe that, as a future preschool teacher, I have competencies to *work in various databases* for recording information about children, their parents, evaluation of educational work, etc. |
| IT6 | I can successfully use digital technologies to *summarize, compare and consolidate* information from different digital sources. |
| IT7 | I am not competent enough to *judge the quality, relevance, accuracy and scope* of digital information. |
| IT8 | I successfully use digital technologies in *finding and collecting* relevant information and educational materials for planned learning situations in the field of Environmental Studies. |
| IT9 | As a future preschool teacher, I have competencies that enable me to use digital technology in *planning* planned learning situations in the field of Environmental Studies. |
| IT10 | I can effectively *adapt, present and methodically transform* digital information and educational materials in accordance with the age of the children and the topic of the planned learning situation in the field of Environmental Studies. |
| IT11 | I am able to apply digital tools for organizing and classifying information (chart diagrams, schemes, planners, schedules, mind maps, animations, video tutorials, etc.) in the field of Environmental Studies. |
| IT12 | I have the necessary competencies for the use of appropriate digital technologies for *designingandcreating* the necessary educational materials for working with children in the realization of the planned learning situation in the field of Environmental Studies. |

IT13 I am competent enough to *apply and integrate* digital technologies in the direct educational work, in the realization of the planned learning situation in the field of Environmental Studies.

IT14 I can *evaluate and document* various Environmental Studies' activities done with children in preschool institutions in many ways, because I have digital competencies that allow me to create, process and archive photos, digital texts, videos, etc.

IT15 I am competent to do *multimedia presentations of content that is interactive* and allows children better understanding as well as easier and faster learning in the field of Environmental Studies.

IT16 I have digital competencies for the meaningful use of digital technologies as tools that *enable children* to access information during the implementation of the planned learning situation in the field of Environmental Studies.

IT17 I am able to use digital technology to enable children to *meaningfully use* digital technologies to express themselves and learn through play within a topic or project in the field of Environmental Studies.

IT18 The digital competencies that I have help me to enable children *to use digital technologies themselves for the purpose of monitoring their own learning.*

IT19 I am competent to use digital technologies in such a way as to enable children to progress at their own pace within the planned learning situations in the field of Environmental Studies, in the way that suits them best.

IT20 I am competent to use digital technologies in such a way as to enable children to make decisions and think critically within the planned learning situations in the field of Environmental Studies.

IT21 I am competent to adequately and safely use the advantages of digital technology in educational work in the field of Environmental Studies.

IT22 Adequate attitude and working etiquette of using digital technologies is necessary for every preschool teahers.

IT23 I believe that preschool teacher should develop awareness and habits in children and parents for the adequate use of digital technologies.

IT24 I believe that as a future preschool teacher I am not competent enough to develop awareness and habits in children and parents for the adequate use of digital technologies.

IT25 I believe it is important that digital technology is used for professional development of preschool teacher.

IT26 I believe that, as a future preschool teacher, I am not always able to control the shortcomings and dangers of applying digital technology.

Table 2. Sample structure of respondents

| Institution | Gender | | | | Total | | Achievement in Informatice | Achievement in MT* | Achievement in MTES** |
|---|---|---|---|---|---|---|---|---|---|
| | Female | | Male | | **Σ** | | | | |
| | *f* | % | *f* | % | *f* | % | | | |
| Vocational studies | 54 | 43,2 | 3 | 2,4 | 57 | 45,6 | 7,44 | 8,04 | 8,56 |
| Academic studies | 61 | 48,8 | 7 | 5,6 | 68 | 54,4 | 7,88 | 8,12 | 8,78 |
| | 115 | 92 | 10 | 8 | **125** | 100 | | | |

*MT = Methodology of Teaching

**MTES = Methodology of Teaching Environmental Studies

Table 3. Normality test – Data distribution

| | | **Kolmogorov-Smirnov** | | |
|---|---|---|---|---|
| | **Gruop** | **Statistic** | **df** | **Sig.** |
| **Gender of respondents** | Vocational studies**(VS)** | 0,540 | 57 | **0,000** |
| | Academic studies **(AS)** | 0,529 | 68 | **0,000** |
| **Achievement in Informatice** | **VS** | 0,195 | 57 | **0,000** |
| | **AS** | 0,179 | 68 | **0,000** |
| **Achievement in Methodology of Teaching** | **VS** | 0,181 | 57 | **0,000** |
| | **AS** | 0,172 | 68 | **0,000** |
| **Achievement in Methodology of Teaching Environmental Studies** | **VS** | 0,241 | 57 | **0,000** |
| | **AS** | 0,196 | 68 | **0,000** |

Table 4. Student achievements in Informatics, Methodology of Teaching and Environmental Studies Methodology

| | Group | Median | Mean Ranks | Sum of Ranks | Kolmogorov-Smirnov test | | Mann-Whitney test | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Statistic | Sig. | U | Z | Sig. |
| **Informatice** | **FG** | 8,00 | 59,60 | 3397,00 | 0,540 | 0,000 | 1744 | -0,986 | **0,324** |
| | **SG** | 8,00 | 65,85 | 4478,00 | 0,529 | 0,000 | | | |
| **Methodology of Teaching** | **FG** | 8,00 | 61,20 | 3488,50 | 0,195 | 0,000 | 1835,5 | -0,522 | **0,602** |
| | **SG** | 8,00 | 64,51 | 4386,50 | 0,179 | 0,000 | | | |
| **Methodology of Teaching Environmental Studies** | **FG** | 9,00 | 59,73 | 3404,50 | 0,181 | 0,000 | 1751,5 | -0,965 | **0,335** |
| | **SG** | 9,00 | 65,74 | 4470,50 | 0,172 | 0,000 | | | |

Table 5. Self-assessment of digital competencies of students of vocational and academic studies.

| Items | Group | Median | Mean Ranks | Sum of Ranks | Kolmogorov-Smirnov test | Mann-Whitney test |
|---|---|---|---|---|---|---|

| | | | | | Statistic | Sig. | U | Z | Sig. |
|---|---|---|---|---|---|---|---|---|---|
| IT1 | FG | 4,00 | 73,23 | 4174,00 | 0,451 | 0,000 | 1355,00 | -3,375 | **0,001** |
| | SG | 5,00 | 54,43 | 3701,00 | 0,271 | 0,000 | | | |
| IT2 | FG | 5,00 | 61,16 | 3486,00 | 0,357 | 0,000 | 1833,00 | -0,627 | 0,531 |
| | SG | 5,00 | 64,54 | 4389,00 | 0,394 | 0,000 | | | |
| IT3 | FG | 5,00 | 59,11 | 3369,00 | 0,455 | 0,000 | 1716,00 | -1,697 | 0.090 |
| | SG | 5,00 | 66,26 | 4506,00 | 0,524 | 0,000 | | | |
| IT4 | FG | 5,00 | 69,39 | 3955,00 | 0,428 | 0,000 | 1574,00 | -2,086 | **0.037** |
| | SG | 5,00 | 57,65 | 3920,00 | 0,325 | 0,000 | | | |
| IT5 | FG | 4,00 | 74,84 | 4266,00 | 0,434 | 0,000 | 1263,00 | -3,753 | **0,000** |
| | SG | 5,00 | 53,07 | 3609,00 | 0,250 | 0,000 | | | |
| IT6 | FG | 4,00 | 68,66 | 3913,50 | 0,358 | 0,000 | 1615,50 | -1,784 | 0,074 |
| | SG | 5,00 | 58,26 | 3961,50 | 0,274 | 0,000 | | | |
| IT7 | FG | 3,00 | 70,91 | 4042,00 | 0,216 | 0,000 | 1487,00 | -2, 325 | **0,020** |
| | SG | 3,00 | 56,37 | 3833,00 | 0,187 | 0,000 | | | |
| IT8 | FG | 4,00 | 67,18 | 3829,00 | 0,364 | 0,000 | 1700,00 | -1,322 | 0,186 |
| | SG | 5,00 | 59,50 | 4046,00 | 0,261 | 0,000 | | | |
| IT9 | FG | 4,00 | 67,93 | 3872,00 | 0,318 | 0,000 | 1657,00 | -1,507 | 0,132 |
| | SG | 5,00 | 58,87 | 4003,00 | 0,235 | 0,000 | | | |
| IT10 | FG | 4,00 | 70,40 | 4013,00 | 0,306 | 0,000 | 1516,00 | -2,384 | **0,017** |
| | SG | 4,00 | 56,79 | 3862,00 | 0,318 | 0,000 | | | |
| IT1 | FG | 4,00 | 71,45 | 4072,50 | 0,235 | 0,000 | 1456,50 | -2,545 | **0,011** |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | SG | 4,00 | 55,92 | 3802,50 | 0,227 | 0,000 | | | |
| IT12 | FG | 4,00 | 67,54 | 3849,50 | 0,286 | 0,000 | 1679,50 | -1,407 | 0,159 |
| | SG | 4,00 | 59,20 | 4025,50 | 0,267 | 0,000 | | | |
| IT13 | FG | 4,00 | 70,30 | 4007,00 | 0,268 | 0,000 | 1522,00 | -2,232 | **0,026** |
| | SG | 4,00 | 56,88 | 3868,00 | 0,251 | 0,000 | | | |
| IT14 | FG | 4,00 | 66,26 | 3777,00 | 0,341 | 0,000 | 1752,00 | -1,056 | 0,291 |
| | SG | 4,00 | 60,26 | 4098,00 | 0,305 | 0,000 | | | |
| IT15 | FG | 4,00 | 72,75 | 4147,00 | 0,371 | 0,000 | 1382,00 | -3,036 | **0,002** |
| | SG | 5,00 | 54,82 | 3728,00 | 0,274 | 0,000 | | | |
| IT16 | FG | 4,00 | 68,79 | 3921,00 | 0,392 | 0,000 | 1608,00 | -2,041 | **0,041** |
| | SG | 4,00 | 58,15 | 3954,00 | 0,377 | 0,000 | | | |
| IT17 | FG | 4,00 | 67,89 | 3870,00 | 0,306 | 0,000 | 1659,00 | -1,553 | 0,120 |
| | SG | 4,00 | 58,90 | 4005,00 | 0,298 | 0,000 | | | |
| IT18 | FG | 4,00 | 70,91 | 4042,00 | 0,283 | 0,000 | 1487,00 | -2,468 | **0,014** |
| | SG | 4,00 | 56,37 | 3833,00 | 0,342 | 0,000 | | | |
| IT19 | FG | 4,00 | 69,84 | 3981,00 | 0,260 | 0,000 | 1548,00 | -2,143 | **0,032** |
| | SG | 4,00 | 57,26 | 3894,00 | 0,298 | 0,000 | | | |
| IT20 | FG | 4,00 | 70,78 | 4034,50 | 0,240 | 0,000 | 1794,50 | -2,382 | **0,017** |
| | SG | 4,00 | 56,48 | 3840,50 | 0,272 | 0,000 | | | |
| IT21 | FG | 4,00 | 68,66 | 3913,50 | 0,300 | 0,000 | 1615,50 | -1,742 | 0,082 |
| | SG | 4,00 | 58,26 | 3961,50 | 0,243 | 0,000 | | | |
| IT22 | FG | 5,00 | 63,73 | 3632,50 | 0,311 | 0,000 | 1896,50 | -0,231 | 0,817 |
| | SG | 5,00 | 62,39 | 4242,50 | 0,311 | 0,000 | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| IT23 | | FG | 4,00 | 59,68 | 3401,50 | 0,257 | 0,000 | 1748,50 | -1,002 | 0,316 |
| | | SG | 4,00 | 65,79 | 4473,50 | 0,253 | 0,000 | | | |
| IT24 | | FG | 2,00 | 69,77 | 3977,00 | 0,265 | 0,000 | 1552,00 | -1,987 | **0,047** |
| | | SG | 3,00 | 57,32 | 3898,00 | 0,227 | 0,000 | | | |
| IT25 | | FG | 4,00 | 65,19 | 3716,00 | 0,311 | 0,000 | 1813,00 | -0,682 | 0,495 |
| | | SG | 5,00 | 61,16 | 4159,00 | 0,267 | 0,000 | | | |
| IT26 | | FG | 4,00 | 67,07 | 3823,00 | 0,290 | 0,000 | 1706,00 | -1,216 | 0,224 |
| | | SG | 4,00 | 59,59 | 4052,00 | 0,293 | 0,000 | | | |
| Total score | | FG | 103,5 | 74,46 | 4244,00 | 0,076 | 0,200 | 1285,00 | -3,239 | **0,001** |
| | | SG | 111,0 | 53,40 | 3631,00 | 0,141 | 0,006 | | | |