Iyer, S. et al. (Eds.) (2022). Proceedings of the 30th International Conference on Computers in Education. Asia-Pacific Society for Computers in Education

Evaluation of the Quality of the Educational Software from the Perspective of Experiences of Italian and Polish Pre-Service Teachers

Łukasz **TOMCZYK**[a*], Laura **FEDELI**[b], Anna **WŁOCH**[c], Pierpaolo **LIMONE**[d], Monika **FRANIA**[e], Piergiorgio **GUARINI**[f], Michał **SZYSZKA**[g], Maria Lidia **MASCIA**[h], & Joanna **FALKOWSKA**[i]
[a] *Institute of Education, Jagiellonian University, Poland*
[b] *Department of Education, Cultural Heritage and Tourism, University of Macerata, Italy*
[c] *Faculty of Pedagogy and Psychology, Pedagogical University of Cracow, Kraków, Poland*
[d] *Rector Foggia University, Italy*
[e] *Faculty of Pedagogy and Psychology, Silesian University, Katowice, Poland*
[f] *Foggia University PhD student in Neuroscience and Education, Foggia, Italy*
[g] *Department of Pedagogy, WSB University, Dąbrowa-Górnicza, Poland*
[h] *Faculty of Humanistic Studies, University of Cagliari, Cagliari, Italy*
[i] *Institute of Educational Sciences, Nicolaus Copernicus University*
lukasz.tomczyk@uj.edu.pl

Abstract: The research involved evaluating the usability of modern educational software in two European countries (Italy, Poland). The research was conducted in the first quarter of 2022 by carrying out an online questionnaire using the LimeSurvey system. The online questionnaire was completed by 1209 prospective teachers. The software evaluation was limited to 22 types of teaching and learning support solutions, namely: Quizizz, Mentimeter, Wakelet, Padlet, Canva, Emaze, Answergarden, Jamboard, Coggle, Creately, Wordwall, LearningApps, Prezi, Kahoot, Plickers, Trimino, Dobble, Genial.ly, ClassDojo, Explain Everything, KhanAcademy, Easelly. The quantitative analysis of the collected data allowed us to draw the following conclusions: 1) In both countries, the most effective tools evaluated as: Canva, Quizizz, Prezi, Kahoot, Wordwall; 2) Canva software is the most well-known digital teaching tool in both countries; 3) There is a large variation in the evaluation of software in both countries; 4) In Poland and Italy pre-service teachers evaluate Canva, Answergarden, ClassDojo, KhanAcademy in a similar way; 5) The vast majority of respondents in both countries have no experience with educational software or rate the software low; 6) Among Italian respondents there is a constant tendency in the evaluation of educational software - a positive evaluation of one type of software is in a positive relation with the evaluation of another type of software; 7) Polish pre-service teachers are more diverse in their evaluation of software - a positive evaluation of one software does not necessarily condition a positive evaluation of another digital teaching resource.

Keywords: software, school, university, teachers, pre-service teachers, Italy, Poland

1. Introduction

Pre-service teachers (current students in the field of pedagogy) are one of the key groups for the development of education. Professional preparation of teachers is a priority issue in many countries (Romano, 2002; Melnyk et al., 2019). The formation of key competences in this group plays a special role for maintaining the quality of formal education. Therefore, due to the changes occurring through the intensive growth of the information society, more and more attention is being paid to the skills, knowledge and attitudes related to ICT use concerning pre-service teachers (Tomczyk & Fedeli, 2022). Digital competence, which encompasses a wide range of activities and extensive knowledge related to the use of ICT in different contexts of professional and private life, is now as much a matter of course as even handling analogue media three decades back. Therefore, the analysis of digital competences in particular professional groups requires taking into account the key conditions of a given profession. One of the strategic elements in the work of contemporary teachers is the use of educational software. This, in turn, is conditioned by knowledge of the potential of given e-solutions, attitude towards ICT (including assessment of software quality), previous experience of using given software (also in another

role, e.g. as a student), the level of basic - basic digital competences, or financial conditions of school institutions (Tomczyk, 2021).

This text is part of the debate on preparing new pedagogical staff in terms of the level of digital competence narrowed down to ICT-supported teaching activities. Such an analysis is necessary in the context of challenges related not only to crisis (pandemic) e-learning, but also relating to the level of attitude towards new media among pre-service teachers.

2. Methodology

2.1 Research aims and procedure

The aim of the research was to evaluate popular educational software among Polish and Italian pre-service teachers. The comparative research is in line with the challenges of educating modern teachers in the information society and is also linked to the modernisation of programmes related to the formation of digital competences in this key group. The aim of the research was clarified by the following five groups of research problems: RQ1: How do pre-service teachers in Poland and Italy assess modern educational software? RQ2: What are the differences and similarities between the evaluation of educational software among students from pedagogical faculties in two European countries?

The research involved students from two European countries, namely Italy (IT) and Poland (PL). 604 students from Italy (Macerata, Foggia, Genoa, Sardinia) and 605 students from Poland (Kraków, Katowice, Toruń, Dąbrowa-Górnicza) were included in the quantitative research. The selection of the study was similar to a random scheme (different regions in both countries). The research was conducted in the first half of 2022 using the online tool LimeSurvey in two languages.

2.2 Characteristics of the research sample

The vast majority of participants in the study were women (IT 85.4%, PL95.0%). This is due to the fact that in both countries the teaching profession is highly feminised. Both teachers and prospective teachers in Poland and Italy are predominantly women. The average age in both countries was similar, in IT=32.1 and in PL=25.5. The main participants of the study were students of the second level of pedagogical studies (Master's), IT = 86.42% PL = 69.25%. The remaining group consisted of undergraduate level students.

2.3 Research tool

The tool used in this study was the one constructed by a team of Polish-Italian media pedagogy researchers (Tomczyk & Fedeli, 2022). This text includes the analysis of one variable from the final version of the tool, which concerned the usability evaluation of educational software. The variable consisted of 22 indicators (of different types of software). Students in both countries could rate the software on a five-point likert scale from 1 - very low usefulness in education to 5 - very high usefulness in education. In addition, respondents could select option 0, which meant that they could not evaluate the software due to unfamiliarity with the software. The triangulation of qualitative and quantitative research results from, among others, the SELI project (Tomczyk & Sunday Oyelere, 2019; Arteaga et al., 2020), as well as the analysis of the literature, allowed the formulation of a software list. In addition, the authors of the tool are authors of academic courses aimed at increasing the level of digital competence in the group analysed. The cumulative teaching and project experience and expert knowledge formed the basis for the shortlisting of educational software. The respondents' own expert experience and also a literature review on current educational software: Quizizz (Zhao, 2019), Mentimeter (Rudolph, 2018), Wakelet (Graham, 2018), Padlet (Beltrán-Martín, 2019), Canva (Rahmonovna & Erkinovana, 2022), Emaze (Nazarenko et al., 2020), Answergarden (Jusmaya, 2022), Jamboard (Alanya-Beltran et al., 2021), Coggle (Debbag et al., 2021), Creately (Ren et al., 2020), Wordwall (Moorhouse & Kohnke, 2022), LearningApps (Behnamnia et al. 2020), Prezi (Strasser, 2014), Kahoot (Wang & Tahir, 2020), Plickers (Shana & Abd Al Baki, 2020), Trimino (Badan & Onishchenko, 2021), Dobble (Baćić Đuračković & Đuračković, 2020), Genial.ly (Kaźmierczak, 2020),

ClassDojo (Williamson, 2017), Explain Everything (Pelton & Pelton, 2013), KhanAcademy (More & Vankadara, 2022), Easelly (Weiner & Lorber, 2021).

3. Results

RQ1: Evaluation of educational software by pre-service teachers in Poland (descriptive statistics)

As mentioned in the introduction, ICT has changed the quality of education. New media have transformed both the quality of learning and the processes involved in teaching. Nowadays (in the post-covid era) there is a need to reflect on the frequency with which different software is used in education. In this section, ways of evaluating popular educational software by pre-service teachers are presented.

Italian students from pedagogical faculties, similarly to their Polish peers, have varying levels of evaluation of particular educational software. Among the most useful they rank: Quizizz, Mentimeter, Padlet, Canva, Jamboard, Wordwall, Kahoot. Also as in the case of Polish pre-service teachers, there is no single trend here. A varied type of software is highly rated, i.e. for creating: quizzes, real-time presentations, mind maps and diagrams, complex graphic forms, individual exercises or tasks based on gamification. However, the majority of students have a problem with evaluating educational software - similarly to Polish students. This means that they do not have sufficient knowledge and experience with the mentioned software. Lack of knowledge - ability to evaluate the mentioned software is also one of the factors blocking the use of digital teaching aids in their future professional work.

Based on the available data collected among Polish students, it was noted that most of the listed software is difficult to evaluate by students of pedagogical faculties. On the other hand, software such as Canva, Quizizz, LearningApps, Prezi, Kahoot, Wordwall, Genial.ly enjoy the greatest recognition - high ratings for particular software. Each of the listed software can be used for a different teaching purpose. Therefore, there is no tendency among the Polish respondents for one type of software. There is also no single type/type of software, which was very negatively evaluated by Polish students. Descriptive statistics (percentages) for the evaluation of particular software are presented in Table 1.

Table 1. *Evaluation of educational software by pre-service teachers in Italy and Poland*

	I have not dealt with this software		Very low usefulness in education		Low utility		Average usefulness		Good usefulness		Very good usefulness	
Country	IT	PL	IT	PL	IT	PL	IT	PL	IT	PL	IT	PL
1.Quizizz	69.2	33.4	1.2	0.5	0.7	1.5	7.5	6.9	13.4	31.2	8.1	26.4
2.Mentimeter	66.1	81.5	1.2	0.0	1.2	1.0	6.8	2.6	9.8	8.3	15.1	6.6
3.Wakelet	87.3	94.0	1.3	0.2	1.0	0.5	4.1	1.5	4.5	2.6	1.8	1.2
4.Padlet	51.3	75.4	1.3	0.5	2.0	0.3	9.8	4.0	14.9	11.4	20.7	8.4
5.Canva	18.7	34.0	2.8	0.2	2.0	1.5	14.2	4.3	30.1	17.9	32.1	42.1
6.Emaze	87.4	95.5	1.2	0.2	0.5	1.2	3.3	0.8	6.0	1.7	1.7	0.7
7.Answergarden	89.4	92.6	0.7	0.3	1.2	1.3	3.1	1.2	4.8	3.1	0.8	1.5
8.Jamboard	67.1	86.8	1.0	0.2	0.8	0.8	8.6	3.0	11.9	6.0	10.6	3.3
9.Coggle	80.0	86.9	1.7	0.3	0.7	0.8	4.0	2.0	7.3	4.6	6.5	5.3
10.Creately	85.8	93.1	1.5	0.5	0.8	0.3	3.8	3.3	6.8	1.8	1.3	1.0
11.Wordwall	60.1	51.7	1.5	0.5	1.5	2.0	7.0	3.8	12.3	18.3	17.7	23.6
12.LearningApps	73.5	56.2	1.5	0.2	1.2	0.7	5.8	4.3	8.6	18.0	9.4	20.7
13.Prezi	72.7	37.0	0.8	1.0	1.2	2.1	7.1	11.9	10.3	24.1	7.9	23.8
14.Kahoot	58.8	25.3	1.2	0.3	0.8	1.5	6.0	4.6	14.9	21.8	18.4	46.4
15.Plickers	89.1	94.0	1.0	0.8	0.2	0.7	3.8	2.1	4.6	1.0	1.3	1.3
16.Trimino	89.9	96.2	1.3	0.3	1.2	0.5	2.8	1.8	4.0	0.7	0.8	0.5
17.Dobble	86.1	75.2	0.7	0.3	1.0	1.5	4.8	3.3	5.6	9.1	1.8	10.6

18.Genial.ly	84.6	57.2	1.2	0.2	0.8	1.2	3.5	6.6	6.6	14.7	3.3	20.2
19.ClassDojo	88.6	87.3	1.2	0.5	0.8	1.0	3.3	3.1	5.0	3.8	1.2	4.3
20.Explain Everything	88.7	95.4	1.5	0.3	0.8	1.2	3.1	1.5	4.3	1.0	1.5	0.7
21.KhanAcademy	88.9	88.1	1.3	0.2	0.7	1.0	3.8	2.3	4.1	4.8	1.2	3.6
22.Easelly	89.4	93.7	1.0	0.2	0.7	1.3	3.5	1.2	4.5	2.6	1.0	1.0

RQ2: Differences in software evaluation between Italian and Polish students

Out of twenty-two types of educational software, only in four cases there are no differences in terms of usability evaluation depending on the country of the respondents. This situation refers to: Canva, Answergarden, ClassDojo, KhanAcademy. It should be mentioned here that Canva is the software most known in the surveyed group in both countries. In the remaining 18 cases, there is a difference in the evaluation of the software. There is no consistent trend in the evaluation of software according to its type. For example, applications such as: Quizizz, Wordwall, LearningApps, Prezi, Kahoot, Dobble, Genial.ly are evaluated higher by Polish pre-service teachers. The differences in effectiveness ratings by country are presented in Table 3. The non-parametric Mann-Whitney U test was used to assess the statistical significance of the differences.

Table 2. *Differences in software evaluation between Italian and Polish students*

	Mean Italy	Mean Poland	Std.Dev. Italy	Std.Dev. Poland	U	Z-adjusted	p-value
1.Quizizz	1.190	2.815	1.863	2.094	109171.0	-13.152	0.000
2.Mentimeter	1.382	0.760	2.023	1.637	154261.5	6.069	0.000
3.Wakelet	0.427	0.220	1.190	0.906	170519.5	3.977	0.000
4.Padlet	1.977	1.008	2.152	1.816	138460.5	8.474	0.000
5.Canva	3.306	2.982	1.820	2.227	181531.5	0.203	0.839
6.Emaze	0.442	0.149	1.226	0.729	167775.0	5.082	0.000
7.Answergarden	0.358	0.264	1.089	0.983	177106.5	1.858	0.063
8.Jamboard	1.291	0.511	1.927	1.350	146328.0	8.129	0.000
9.Coggle	0.763	0.529	1.613	1.415	170496.0	3.111	0.002
10.Creately	0.483	0.233	1.256	0.895	169244.0	4.155	0.000
11.Wordwall	1.629	2.074	2.108	2.231	163962.5	-3.426	0.001
12.LearningApps	1.028	1.898	1.808	2.207	146524.0	-7.019	0.000
13.Prezi	1.053	2.565	1.795	2.099	113595.5	-12.535	0.000
14.Kahoot	1.722	3.367	2.145	2.062	110220.5	-12.691	0.000
15.Plickers	0.379	0.192	1.136	0.826	173470.5	3.158	0.002
16.Trimino	0.321	0.119	1.027	0.635	171154.5	4.319	0.000
17.Dobble	0.487	1.025	1.265	1.848	160459.0	-5.320	0.000
18.Genial.ly	0.563	1.820	1.390	2.176	128855.0	-11.083	0.000
19.ClassDojo	0.384	0.486	1.132	1.333	179715.5	-0.872	0.383
20.Explain Everything	0.373	0.144	1.121	0.698	170475.0	4.299	0.000
21.KhanAcademy	0.364	0.464	1.097	1.309	180478.0	-0.664	0.507
22.Easelly	0.356	0.218	1.090	0.885	174898.5	2.670	0.008

4. Limitations of the study

The list of educational software and OER mentioned in the study is limited. This means that a wide range of other solutions to support the learning and teaching process were not included in the study. In general, creating a complete list is an extremely difficult (or even impossible) task at the current stage of development of the information society. Future editions of the study should feature an expanded list of educational software. In addition, the evaluation of the listed software was carried out on the basis of the

subjective feelings of future educators (e.g. based on their own complex educational experiences), which means that the scale used is not sharp and needs to be refined at a later stage. Due to the limitations of the length of the text, it is also postulated that the statistical analyses should be extended to include issues related to socio-demographic characteristics (level of study, gender, metric age, place of residence), which will be carried out in subsequent research projects. The study sample is highly feminised as highlighted by one of the reviewers. Nevertheless, it should be emphasised that this is a typical situation in this group in both countries and is not a methodological limitation in the strict sense.

5. Conclusions

Analyses of the young generation of users show that this is a generation that uses new media intensively in a way that differs from previous generations, e.g. those in middle adulthood. Many myths have grown up around the generation of digital natives - the group studied in this text (Margaryan et al., 2011). One of them is the assumption that the representatives of this group use all the possibilities offered by new media, or cyberspace, in an intentional and effective way. The data collected among future pedagogical staff in Poland and Italy, as well as previous comparative studies conducted in other countries (Eger et al., 2018), show that there is a gap in the constructive and full use of the potential of new media. The descriptive statistics presented clearly show that most educational software is unknown to young pedagogical students in the two European countries. Despite the fact that these are people who use ICT very intensively in the area of communication and entertainment, there is a gap among most of the respondents related to the evaluation of educational software due to the lack of digital competence oriented towards the teaching profession.

Of course, this article (the methodology used related to the selection of the software list) can be discussed in the area of adding or removing selected solutions based on the use of software in education. Nevertheless, the collected data clearly suggest a gap in the preparation of teachers in terms of digital teaching resources, as well as having undeveloped experiences related to the use of modern software in the learning and teaching process (Jagušt et al., 2018). Those who are able to fully evaluate educational software with any experience in this area are a minority. Thus, the collected data provide a signpost for educational institutions, which should continuously monitor the level of professional digital competence of future pedagogical staff and, at the same time, modify academic courses preparing for the profession in the context of challenges related to the digitalisation of education.

Acknowledgements

The article was written as part of the project "Teachers of the future in the informationsociety—between risk and opportunity paradigm" funded by the Polish National Agency for Academic Exchange under the Bekker programme Grant number: PPN/BEK/2020/1/00176.

References

Alanya-Beltran, J., Salvatierra, M. S. A., Espinoza, M. D., & Tataje, F. A. O. (2021). Educación durante la pandemia COVID-19. Uso de la tecnología en la nube: Jamboard. *Revista Ibérica de Sistemas e Tecnologias de Informação*, (E44), 39-48.

Arteaga, M., Tomczyk, Ł., Barros, G., & Sunday Oyelere, S. (2020). *ICT and education in the perspective of experts from business, government, academia and NGOs: in Europe, Latin America and Caribbean*. Universidad del Azuay.

Baćić Đuračković, L., & Đuračković, V. (2020). Matematički Dobble. *Poučak: časopis za metodiku i nastavu matematike*, 21(84), 52-57.

Badan, A., & Onishchenko, N. (2021). Multimedia technologies in foreign language learning under pandemic. In *CEUR Workshop Proceedings* (Vol. 2870, pp. 642-656).

Behnamnia, N., Kamsin, A., & Ismail, M. A. B. (2020). The landscape of research on the use of digital game-based learning apps to nurture creativity among young children: A review. *Thinking Skills and Creativity*, 37, 100666.

Beltrán-Martín, I. (2019, July). Using Padlet for collaborative learning. In *HEAD'19. 5th International Conference on Higher Education Advances* (pp. 201-211). Editorial Universitat Politècnica de València.

Debbag, M., Cukurbasi, B., & Fidan, M. (2021). Use of digital mind maps in technology education: a pilot study with pre-service science teachers. *Informatics in Education*, 20(1), 47-68.

Eger, L., Klement, M., Pisoňová, M., & Petrová, G. (2018). Different user groups of university students and their ICT competence: evidence from three countries in central Europe. *Journal of Baltic Science Education*, 17(5), 851.

Graham, K. (2018). TechMatters: Doing Digital Curation with Wakelet. *LOEX Quarterly*, 45(2), 3.

Jagušt, T., Botički, I., & So, H. J. (2018). Examining competitive, collaborative and adaptive gamification in young learners' math learning. *Computers & Education*, 125, 444-457.

Jusmaya, A. (2022). The Effectiveness of Using Answer Garden Application as Brainstorming Activity in Online Learning. *Komposisi: Jurnal Pendidikan Bahasa, Sastra, dan Seni*, 23(1), 70-81.

Kaźmierczak, P. (2020). Czy aplikacja Genial. ly rzeczywiście jest genialna? O potencjale narzędzi online podczas zdalnego nauczania języka polskiego jako obcego. *Acta Universitatis Lodziensis. Kształcenie Polonistyczne Cudzoziemców*, (27), 559-570.

Margaryan, A., Littlejohn, A., & Vojt, G. (2011). Are digital natives a myth or reality? University students' use of digital technologies. *Computers & Education*, 56(2), 429-440.

Melnyk, N., Bidyuk, N., Kalenskyi, A., Maksymchuk, B., Bakhmat, N., Matviienko, O., ... & Maksymchuk, I. (2019). Models and organisational characteristics of preschool teachers' professional training in some EU countries and Ukraine. *Zbornik Instituta za pedagoska istrazivanja*, 51(1), 46-93.

Moorhouse, B. L., & Kohnke, L. (2022). Creating the Conditions for Vocabulary Learning with Wordwall. *RELC Journal*, 00336882221092796.

More, N. S., & Vankadara, R. (2022). Online Teaching Tools: Challenges and Their Solutions During a Pandemic Available in India. In *ICT Analysis and Applications* (pp. 547-556). Springer, Singapore.

Nazarenko, L., Palamar, S., Vaskivska, H., & Nezhyva, L. (2020). Didactic Potential of New Generation ICT in Forming Information and Communication Competence of Upper Secondary School Pupils. In *ICTERI* (pp. 248-261).

Pelton, T., & Pelton, L. F. (2013, March). Using an iPad to Explain Everything by creating interactive activities and vignettes. In *Society for Information Technology & Teacher Education International Conference* (pp. 4843-4847). Association for the Advancement of Computing in Education (AACE).

Rahmonovna, O. D., & Erkinovana, B. D. (2022). Creator of Online Presentations Canva. com Possibilities of Application in All Areas of the Program. *International Journal of Development and Public Policy*, 2(2), 52-55.

Ren, R., Castro, J. W., Santos, A., Pérez-Soler, S., Acuña, S. T., & de Lara, J. (2020). Collaborative modelling: chatbots or on-line tools? An experimental study. In *Proceedings of the Evaluation and Assessment in Software Engineering* (pp. 260-269).

Romano, M. (2002). Training teachers for quality education in Europe. *European journal of teacher education*, 25(1), 11-17.

Rudolph, J. (2018). A brief review of Mentimeter–A student response system. *Journal of Applied Learning & Teaching*, 1(1), 35-37.

Shana, Z. A., & Abd Al Baki, S. (2020). Using Plickers in Formative Assessment to Augment Student Learning. *International Journal of Mobile and Blended Learning (IJMBL)*, 12(2), 57-76.

Strasser, N. (2014). Using Prezi in higher education. *Journal of College Teaching & Learning (TLC)*, 11(2), 95-98.

Tomczyk, Ł. & Fedeli, L. (2022). *Digital Literacy for Teachers*. Lecture Notes in Educational Technology. Singapore: Springer.

Tomczyk, Ł. & Fedeli, L., (2022). *Digital literacy pre-service teachers' English tool.* 10.13140/RG.2.2.23634.84169

Tomczyk, Ł. (2021). Declared and real level of digital skills of future teaching staff. *Education Sciences*, 11(10), 619.

Tomczyk, Ł., & Sunday Oyelere, S. (2019). *ICT for Learning and Inclusion in Latin America and Europe. Case Study From Countries: Bolivia, Brazil, Cuba, Dominican Republic, Ecuador, Finland, Poland, Turkey, Uruguay*. Cracow: Pedagogical University.

Wang, A. I., & Tahir, R. (2020). The effect of using Kahoot! for learning–A literature review. *Computers & Education*, 149, 103818.

Weiner, A., & Lorber, K. (2021, March). Infographics: A Methodology for Student Research Presentations and Other Academic Projects. In *Society for Information Technology & Teacher Education International Conference* (pp. 649-652). Association for the Advancement of Computing in Education (AACE).

Williamson, B. (2017). Decoding ClassDojo: Psycho-policy, social-emotional learning, and persuasive educational technologies. *Learning, Media and Technology*, 42(4), 440-453.

Zhao, F. (2019). Using Quizizz to Integrate Fun Multiplayer Activity in the Accounting Classroom. *International Journal of Higher Education*, 8(1), 37-43.