

## TEACHER TRAINEES' ATTITUDE TOWARDS THE IMPLEMENTATION OF SELECTED WEB-BASED APPLICATIONS IN TEACHER TRAINING

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**Abstract:** The aim of this study is to investigate the attitudes of teacher trainees towards web-based applications which can be used in education. This paper presents the results of a survey conducted at the J. Selye University, based on the data of 397 questionnaires. Based on the frequency analysis of the answers, we can see that the trainees clearly appreciate the applicability of the presented web-applications, and they consider them interesting and effective in terms of learning. This fact is also supported by open questions about advantages and disadvantages, in the answers the methodological aspects of web applications are mostly highlighted. Based on pairwise comparisons of the factors we found that the applicability of web applications received a significantly higher evaluation than the others with the exception of efficiency. The students' opinion confirmed that the selected web applications are applicable in education, in general, but some of the students are not convinced that they will use them in their own pedagogical practice. The comparison of distributions of several related samples using a non-parametric Friedman-test, resulted in the rejection of the null hypothesis that the variables are from the same distribution. Based on pairwise comparisons using the Wilcoxon signed rank test, the applicability of web-applications received a significantly higher evaluation than the others, with the exception of efficiency.

**UDC Classification:** 378, **DOI:** 10.12955/cbup.v7.1389

**Keywords:** web-based application, teacher training, teacher attitudes

### Introduction

In our research, which was carried out at the Faculty of Education at the J. Selye University, Slovakia, we dealt with the analysis of the market of web-based applications, the analysis of selected web-based applications from technical-didactical aspects and with the possibility of their integration in the higher education training of future teachers. Within the project we focused mainly on commercially developed web-based applications which also have an educational potential. The providers of many such web applications offer free access to their online environment and digital capacities for educational purposes.

### Theoretical background

Training teachers to use technology in the classroom meaningfully is a central problem in the field of education in the twenty-first century (Bolick et al., 2003). Teachers must be prepared to involve their pupils effectively in the digital learning environment and to show them how to learn and how the acquired knowledge should be used for their development and practice (UNESCO NA, 2012). Foreign studies recommend and justify the importance of incorporating digital technologies and on-line tools in the preparation of future teachers with the intention of improving the learning process of future teachers and to professionally develop their knowledge and skills in the field of the methodology of their subject from the aspect of applying digital tools in their future practice (Albion, 2008). They also point out the potential of creating networks between teachers, students, and participating in the creation of learning content (Greenhow, 2007), which is also one of the requirements of digital society.

Future teachers are expected to be able to use technology for their productivity (for example, to be "in", thus part of the digital world by presenting different content), but also to be able to prepare the effective integration of technology into education. However, the preparation of a meaningful integration of technology is absent in the curriculum of teacher training. As a result, the graduates of faculties of education have only limited and superficial knowledge and skills in the application of technology in education (Cantu, 2000).

### Teacher training today

The current situation in Slovakia is that interest in the teaching profession is falling rapidly. In addition, we do not notice any changes in the preparation of future teachers aiming to improve the quality of education in line with the expectations of the information society. The knowledge of the gradually growing "digital generation of children" is changing, and unfortunately teacher training study

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programmes in Slovakia do not reflect the necessary changes in the development of the teacher's new competencies, which are needed so that the teacher could motivate pupils and manage their active learning process in a changing world (Brestenská et al., 2014; Branisa & Jenisova, 2015).

### **Web-based applications in education**

Web-based applications are online programmes running through web browsers and using the http protocol to create, edit, format, upload, download, organize and share textual, audio-visual and other forms of digital content. Web applications are most often viewed in a web browser, but there are also client-based applications where a small portion of the programme is downloaded to the desktop, but processing is done over the Internet on an external server. Currently, many web applications have a mobile application as well, which can be excellently used in pedagogical practice (Čevajka & Velmovská, 2016; Šponiar & Brestenská, 2014; Csiba, 2016; Brestenská, Cibulková & Ivánková, 2017) and they also have added value in our research goals.

Heafner and Friedman (2008) see the great advantage of web applications in that users (teacher, student) can cooperate in the creation of digital content without having to work in the complicated language of HTML. According to Adcock and Bolick (2011), using the easy-to-use WYSIWG ("what you see is what you get") interface, web tools enable students to create their educational content in textual, visual, audio forms in different contexts, transforming their knowledge into the digital environment. Csiba (2018) analysed the use of automatically evaluated tests in online environments. Grant and Mims (2009) highlight the usability of web-based applications in education and point out that the constraints of web applications for access and financial costs are now largely reduced, allowing students to use a wide variety of web applications. At the same time, the benefits of web applications for teachers are explained by their easy access, the availability of different content as well as their integration into the teacher's own online education environment, which corresponds to the ideas of constructivist learning.

### **Methodology and data collection**

The aim of our survey was to find out the attitude of teacher trainees towards web-based applications that can be used in education. Prior to the survey, web applications were introduced to the trainees, one application per lesson, which were then evaluated by the trainees according to various aspects. The trainees were informed about the possibilities of using 7 applications in education: GeoGebra, GoConqr, Padlet, Quick Rubric, PollEverywhere, Sutori and Timetoast. On the basis of the questionnaire, the trainees evaluated them and expressed their opinion on the negative and positive aspects of the applications. In our study, we present the overall evaluation of the responses received, comparing the evaluations of the individual web applications according to the examined factors.

The survey was carried out in the first (winter) term of the 2017/18 academic year. The participants of the survey were the teacher trainees of the J. Selye University, Faculty of Education, Bachelor's and Master's levels.

A total of 397 questionnaires were processed. The vast majority of respondents belong to the 20-25 age group and are female, reflecting the feminisation of the teaching profession. Respondents cannot be identified because of anonymity. The statistical sample can be considered homogeneous according to the age and gender of the respondents, which does not allow the responses to be grouped according to these two criteria.

### **Measuring instrument**

We used our own questionnaire compiled by the project team to carry out the survey. In addition to the age, gender and study programme of the respondent, the questionnaire included 6 closed questions (Q1-Q6) and 2 open questions related to the presented web applications.

Question Q1 was related to the knowledge about the given application with a yes/no answer. Questions Q2-Q6 determined the examined factors and aspects of the presented web-applications and were evaluated on a Likert scale from 1 to 5, where the degree of agreement increases with the score. Based on the five examined factors, the trainees evaluated whether the web-application: is interesting (Q2); is applicable in education in general (Q3); can make learning more efficient (Q4); should be used in teacher training (Q5); will be used by the respondent in his/her teaching practice (Q6).

The statistical analysis of the data was carried out using SPSS software. The reliability of the questionnaire is considered to be sufficiently high based on the Cronbach's alpha value of 0.912. Cronbach's Alpha if item deleted value is less than 0.9 for every item. This means that removing any of

the questions will not reduce reliability. Testing the test questions with the split-half model, we obtained Spearman-Brown Coefficient 0.883 and Guttman Split-Half Coefficient 0.870, which also confirm the high reliability of the test. It should be noted that high reliability can be caused by correlation between items (Chráska, 2016), (Nisbet, Elder, & Miner, 2009). Inter-item correlation is greater than 0.6 for every pair of items in our case.

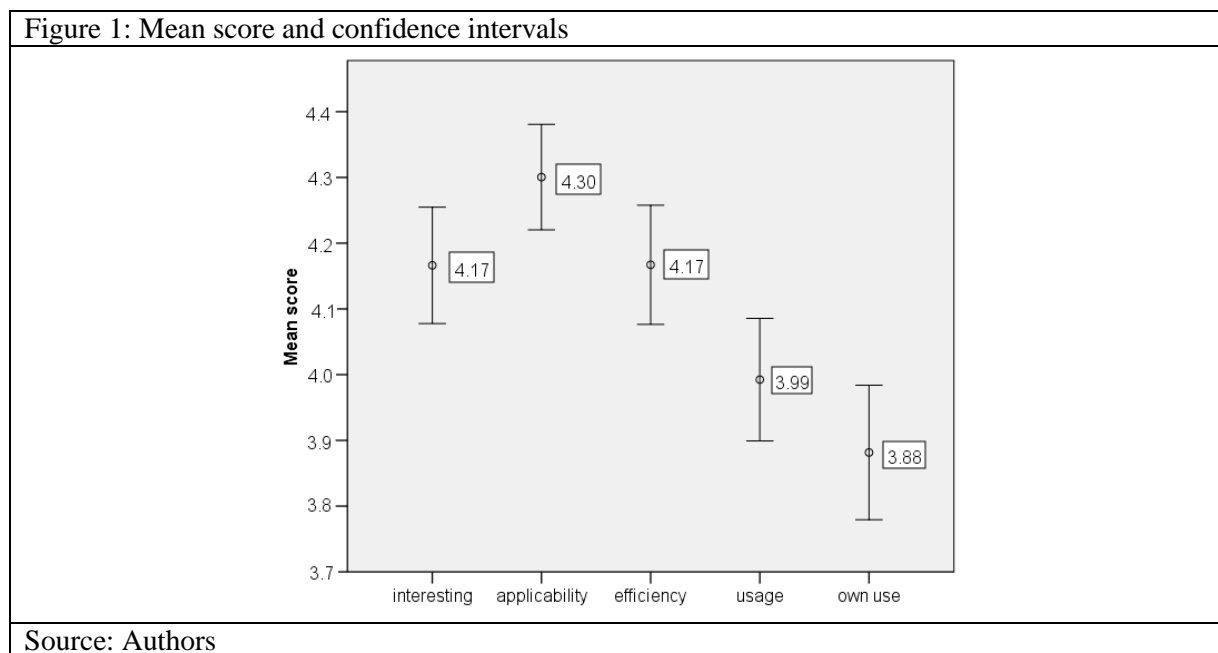
**Results and discussion**

The analysis of the data concerning the trainees’ attitude towards the use of selected web-based applications consisted of three parts. The frequency analysis compared the distribution of scores. By examining the mean score, we compared the particular factors. For open questions we analysed text responses.

**Frequency analysis**

Based on the first question, we found out that for the majority of students (97.0%) the presented applications were unknown. That is, they had not met them either in their everyday digital world or during their studies.

The vast majority (78.1%) of trainees found the presentation of the applications interesting and gave a 4 resp. 5 score. 17.4% of respondents gave a medium score evaluation, and 4.5% of the respondents categorized the application as not or not at all interesting. Trainees who find the web application interesting usually assume that they can be applied well in education (Q2 and Q3 inter item correlation is 0.681). Since 84.3% of answers were 4 or 5, this means that some of the trainees gave a higher rating than in Q2. The presented applications are not considered applicable in education only by 3.0% of respondents. The next question (Q4) examined whether the presented application can make the learning and teaching process more efficient. 5.8% of respondents disagree with this, 15.2% have a medium score rating. According to other responses (79.0% in total), trainees agree with the possible positive role of applications in making learning more effective. Fewer people (71.8%) consider it important that the web application should be used in education. Comparing the evaluation of the question of whether the web application should be used in teacher training with the evaluation of the question about the trainees’ own use of the application in their own teaching practice, we can observe a difference. 35.0% of respondents fully agree with the use of web apps in teacher training, while 34.0% would use it in their own practice. Another 36.8% agree with the use of web apps in teacher training, however, only 32.2% would use it themselves. Approximately a quarter of the trainees represent a neutral position and 6.5% do not think that the application should be applied in education, 9.8% would not use it.



The distribution of scores for questions cannot be considered normal, as One-Sample Kolmogorov-Smirnov Test resulted  $p < 0.01$  for every sample. Normality is not met for the particular variables, so non-parametric methods were used for mean comparison.

### Mean comparison

Comparing the average rating of individual factors, we see what trainees consider more important in relation to a particular web application.

Since the distribution of scores is not normal and independence of the factors cannot be assumed, a non-parametric comparison of several related samples was performed using the Friedman test. The non-parametric Friedman test for related samples compares the distributions of variables. According to the test, the distribution of responses in the 5 question groups is not the same. The result of the Friedman test revealed significant difference in average values ( $N = 395$ , Chi-square = 132.0,  $df = 4$ ,  $p$ -value < 0.01). Due to the significant result of the Friedman test for the distribution of variables, the difference was also compared in pairs with a two-sample test. According to the Wilcoxon Signed Rank test, with the exception of Q2-Q4 ( $p$ -value = 0.741), all pairwise comparisons show a significant difference ( $p$ -value < 0.01).

### Analysis of open questions – advantages and disadvantages of web-applications

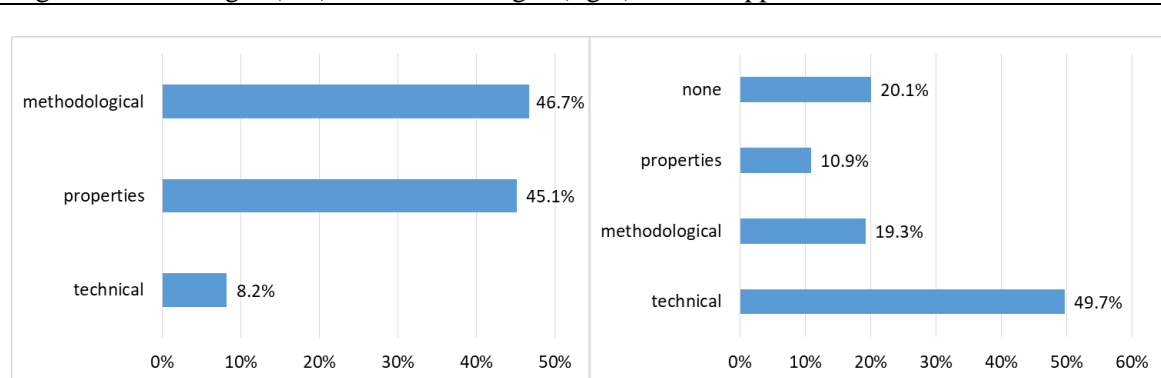
The questionnaire also contained two open questions in which the trainees could formulate the advantages and disadvantages of each application in more detail. During the evaluation, answers were classified into three basic categories based on the nature and content of answers: methodological, properties and technical. Respondents could list more advantages or disadvantages, which were evaluated separately. 5.0% of respondents did not give any advantages of web applications, and 21.0% of respondents did not give disadvantages.

In their answers, the majority of respondents (46.7% of the answers) named the possibilities of using the given application in education as an advantage. The most common methodology related answers were that the application: can effectively help teaching and the work of the teacher; makes the lesson interesting, catches learners' attention; motivates and activates learners; makes the curriculum more interesting and saves time for the teacher.

As a further advantage, the majority of respondents (45.1%) described the characteristic features of the given applications. The most frequently highlighted features of applications were that the application can be used easily, is practical, has a good visual appearance, is attractive, modern and has useful functions.

At the same time, the above answers also show which features are considered important by trainees when using an application, and which conditions they expect from a modern application.

Figure 2: Advantages (left) and disadvantages (right) of web-applications



Source: Authors

Some of the trainees also considered it important to emphasize that the given application is free and accessible to everyone online, which are in fact not negligible aspects in terms of using the applications in education. Another significant aspect can be the language of the application, which can play an important role in the efficient use of the application during a lesson, though this aspect was mentioned only in two answers, where the language of the application was Hungarian. Language version was mainly included in the disadvantages.

In their answers, 20.1% of respondents claim that the presented applications have no disadvantages. In most of the answers (49.7%), the trainees highlighted the technical disadvantage of the application,

namely that the use of the application requires the Internet with adequate bandwidth and also requires a computer or an appropriate mobile device, which is not always available during lessons and for all students.

We have listed responses connected with language version to the technical disadvantages of the application. Among the technical disadvantages, the lack of a Hungarian version represented 37.0% of the answers. Most web-based applications are in English, which can really be a disadvantage for pupils at lower primary school. As our project supports the use of the presented web-based applications in education, the free availability of the application is also an important criterion. The trainees considered it as a disadvantage if the software or certain additional functions were no longer free of charge.

In the case of methodological disadvantages (19.3% of the answers), respondents indicated problems connected with using the applications during lessons. The most common answers were connected with the disadvantages of using the applications in teaching; from a methodological point of view, difficulties in using the application; more difficult to use in different grades (e.g. lower level of primary school); the possible problems in teaching different subjects. In some cases, the students considered as a disadvantage, that the use of the application requires prior knowledge and skills, which is difficult to master or takes a lot of time.

Opinions on the properties of applications accounted for 10.9% of the responses. These primarily criticized some of the features of the application such as incomplete functions; poor visual appearance; or they suggested the use of a more suitable application.

### **Conclusions**

Already on the basis of the frequency analysis of the answers, it can be seen that teacher trainees clearly appreciate the applicability of web applications, and they consider them interesting and effective in terms of learning. During the survey, the applicability of web applications in pedagogical practice reached the highest rating and was significantly higher compared to other factors. By comparing the factors we found that what was thought to be interesting by the trainees was also considered efficient for learning. Trainees are motivated by an interesting application, which is also connected with the efficient use of the application. Comparing the factors of applicability in education with the expected usage in teacher training, a noticeable difference can be observed: some of the respondents who considered the web applications to be applicable do not want to include these applications in teacher training. The students' opinion confirmed that the selected web applications are applicable in education in general, but some of the students are not convinced that they will use it in their own pedagogical practice. The great difference between the answers suggests that the methodological possibilities of using educational applications could not be properly recognized by the students. The integration of web applications in the curriculum of teacher training could bring positive change to this situation, so students would encounter them more often during their training.

Comparing the answers in open question categories we see that most of the methodology related answers students consider as an advantage. The visual appearance, the interface of the applications and their functions were also positively described features highlighted as advantages. However, the responses to the technical aspects were mostly classified as disadvantages, although the need of permanent Internet connection and appropriate digital devices are necessary technical conditions for the use of web applications in education.

Our aims were to make representative surveys in the aspect of the age and gender distribution of students as well as the study programmes of respondents; however, the belief that the generation of future teachers – who are experiencing online forms and methods of education during their own studies – is being educated in the spirit of integrating online applications into education, and the positive feedback of future teachers on selected web applications in the survey confirm the relevance of integrating web application in the didactic preparation of our trainees. Thus, we can support the trainees' easier adaptation to the constantly changing technologies of the information society.

### **Acknowledgements**

This paper was supported by the project of the cultural-educational grant agency of the Ministry of Education of the Slovak Republic KEGA project no. 002UJS-4/2016 entitled "Web-Based Applications in the Transdisciplinary Training of Teacher Education".

## References

- Adcock, L. - Bolick, Ch. . (2011). Web 2.0 tools and the evolving pedagogy of teacher education. *Contemporary issues in technology and teacher education* (11.2), pp. 223-236. Retrieved 02 05, 2018, from <https://www.citejournal.org/volume-11/issue-2-11/current-practice/web-2-0-tools-and-the-evolving-pedagogy-of-teacher-education>
- Albion, P. R. (2008). Web 2.0 in teacher education: Two imperatives for action. *Computers in the Schools*(25.3-4), pp. 181-198, <https://doi.org/10.1080/07380560802368173>
- Bolick, C., Berson, M., Coutts, C., & Heinecke, W. (2003). *Technology applications in social studies teacher education: A survey of social studies methods faculty. Contemporary Issues in Technology and Teacher Education*, 3(3), pp. 300-309. Retrieved 04 06, 2018, from <http://www.citejournal.org/vol3/iss3/socialstudies/article1.cfm>
- Branisa, J., & Jenisova, Z. (2015). The use of computer aided experiment in enhancing the ability of students to understand the graphical presentation of chemical processes. *Procedia-Social and Behavioral Sciences* (197), pp. 2229-2235, <https://doi.org/10.1016/j.sbspro.2015.07.364>
- Brestenská, B. et al. (2014). Inkubátor inovatívnych učiteľov prírodovedných predmetov na ZŠ a SŠ. In: *Zborník z medzinárodnej vedeckej konferencie Univerzity J. Selyeho - 2014: "Vzdelávanie a veda na začiatku XXI. storočia" - Sekcie pedagogických vied.*, pp. 47-58.
- Brestenská, B., Cibulková, J., & Ivánková, P. (2017). The Use of Digital Technologies in the Science Camp VEBOR. *An independent scientific journal for interdisciplinary research in pedagogy* (104).
- Cantu, D. A. (2000). Technology integration in preservice history teacher education. *Journal of the Association for History and Computing* (3(2)), pp. 1-19.
- Čevajka, J., & Velmovská, K. (2016). Pozorujeme hologram s použitím tabetu? pp. 40-45. Retrieved 01 11, 2018, from [https://ufv.science.upjs.sk/\\_projekty/smolenice/pdf\\_16/07\\_čevajka\\_velmovska.pdf](https://ufv.science.upjs.sk/_projekty/smolenice/pdf_16/07_čevajka_velmovska.pdf)
- Chráška, M. (2016). *Metody pedagogického výzkumu*. Praha: Grada Publishing.
- Csiba, P. (2016). GeoGebra appletek webes felületeken és online oktatási környezetekben. In: *Zborník medzinárodnej vedeckej konferencie Univerzity J. Selyeho - 2016*, pp. 21-24.
- Csiba, P. (2018). Automatikusán kiértékelődő online tesztek matematikából. In: *Book of selected papers of the Hungarian Language Teacher Training Faculty's scientific conferences*, pp. 342-347.
- Grant, M. M. - Mims, C. (2009). Web 2.0 in teacher education: Characteristics, implications and limitations. *Wired for learning: An educators guide to Web (2)*, pp. 343-360. Retrieved 03 05, 2018, from <https://www.clifmims.com/documents/Web2.0-in-TchrEd.pdf>
- Greenhow, C. (2007). What Teacher Education Needs to Know about Web 2.0: Preparing New Teachers in the 21st Century. *Society for Information Technology and Teacher Education International Conference 2007*, pp. 1989-1992.
- Heafner, T. L. - Friedman, A. M. (2008). Wikis and constructivism in secondary social studies: Fostering a deeper understanding., 2008, *Computers in the Schools* ( 25.3-4), pp. 288-302, <https://doi.org/10.1080/07380560802371003>
- Nisbet, R., Elder, J., & Miner, G. (2009). *Handbook of statistical analysis and data mining applications*. Academic Press.
- Šponiar, M.; Brestenská, B. (2014). Implementácia mobilných zariadení do vyučovania: Prípadové štúdie. *Biológia, Ekológia, Chémia*, 18(4).
- UNESCO NA. (2012). *Mobile Learning for Teachers in North America. UNESCO Working Paper Series on Mobile Learning*. Authored for UNESCO by Fritschi, J. - Wolf, M.A.