Exploring the Determinants Affecting the Adoption of Social Web Applications Used in Massive Online Open Courses

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Abstract. High dropout rates are one of the major issues of Massive Online Open Courses (MOOCs). Benefits of social Web applications such as active participation in creating, sharing and managing content, simultaneous work on the same artefact, synchronous and asynchronous interaction, and variety of functionalities that stimulate productivity in performing assignments have the potential to boost students' motivation and thus address the aforementioned issue. Successful implementation of social Web applications in educational settings is largely influenced by their acceptance by students. With an objective to examine the forerunners of adoption in the context of social Web applications commonly used in MOOCs, an empirical study was conducted. Participants in the study were students of one Croatian higher education institution. Data was collected by means of the post-use questionnaire. Results of data analysis uncovered the extent to which evaluated social Web applications differ with respect to determinants of their adoption.

Keywords: Adoption · Collaboration · Education · Social Web application · Empirical study · Post-use questionnaire · Wiki · Google Docs · Massive Online Open Courses

1 Introduction

Fast development of information-communication technology and its applicability in all human endeavour have led to the emergence of information society, which strives increasingly to become a knowledge society on a global scale. Supporting e-inclusion is considered as very important as its aim is to eliminate the digital divide, i.e. an inequality between groups of individuals or communities regarding their efficient use of ICT in economy and other aspects of a knowledge-based society [16]. Education plays an important role in engaging every individual in the process of building a knowledge society and it is thus crucial to find models of learning and teaching that will promote social inclusion [16]. E-education has been recognized as one of the key components in the process of building a knowledge society. In recent years, different forms of online

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learning have appeared, from closed ones to open learning. They have led to a new form called Massive Online Open Courses (MOOC's) [2].

1.1 Massive Online Open Courses

The main characteristics of Massive Online Open Courses (MOOCs) are mass and free access available to any individual, regardless of the nature of the participation, which can differ with respect to an individual's educational needs [17]. According to Rajabi and Virkus [34], one of the goals of MOOCs is to ensure online courses of high quality where all individuals have equal educational opportunities. MOOCs represent an innovation in education and their successfulness is derived from the fact that they "reflect the personal, networked, and openly collaborative practices and principles of Web 2.0" [17]. The power of the MOOCs is based on the engagement of a large number of self-organized students and their connections within a certain course platform or their interaction with particular social Web application [7]. Co-creation with learners, low marginal costs for the scaling, lack of location- and time-dependency, individualization of teaching services, and enhanced reputation on the educational market are just some of many advantages MOOCs offer to educational institutions [45].

Regarding the structural differences observed from pedagogical and technical standpoints, MOOCs can be divided into two basic categories [7, 34–36, 45]: cMOOCs and xMOOCs. These two categories represent completely different models of learning and teaching. While cMOOCs are drawing on connectivism and networking, xMOOCs rely on cognitive-behaviourist approach. In that respect, xMOOCs are more tutor-centric, whereas cMOOCs are student-centric models in which learners' autonomy, peer-to-peer learning and social networking are more prominent [35].

Saadatmand and Kumpulainen [36] have highlighted the importance of understanding networked learning that represents a form of learning in which social media and Web technologies intermediate in connecting human resources, content and digital artefacts. The results of their research have shown that involvement in MOOCs encourages participants to develop self-organization, self-motivation and a satisfactory level of technological knowledge to be able to manage a large amount of resources. It is important to note that in MOOCs there are participants with different personal characteristics, including socio-demographic factors, learning styles, competences, personal goals, etc. In that respect, understanding factors that influence acceptance and continued use of MOOCs by a heterogeneous group of participants is of great importance for the successful integration of MOOCs in different forms of education.

The number of MOOCs in higher education is growing exponentially [36]. However, practice and research have shown certain shortcomings of MOOCs pointed out by students. According to Rajabi and Virkus [34], some of them are: low rate of finishing MOOCs, lack of motivation for active participation and insufficient knowledge and skills to use ICT. The authors stated that students believe designing a more interactive platform could boost participants' motivation. Being social Web applications, wikis and collaborative editors are a representative sample of interactive educational platforms.

1.2 Social Web Applications as a Backbone of Massive Open Online Courses

Wiki is a set of structured pages and as such represents a universal mean for information exchange and knowledge management. In the educational environment, wiki refers to a collection of information which arises from active participation of students and teachers thus evolving with each new entry. According to Parker and Chao [33], wikis provide support for various approaches to learning including collaborative and constructivist paradigm as well as narrative analysis and cognitive apprenticeship. Drawing on their work, Orehovački et al. [23] determined following uses of this social Web application: (1) wiki as a tool for documenting group work where each wiki page represent a separate report; (2) wiki as a knowledge repository composed of artefacts created by means of other desktop, Web, or mobile applications and integrated with or connected to wiki page; and (3) wiki as a platform for asynchronous communication and collaboration among stakeholders of the educational ecosystem.

Owing to their features, wikis started to be actively employed in educational settings even before the emergence of other social Web applications. In the last decade, they have become an essential part of diverse educational processes including teaching a foreign language [13], mathematics [14], statistics [19], information systems [12], etc. However, results of prior studies on utilizing wiki as a collaboration tool for educational purposes are quite mixed. For instance, Elgort et al. [10] found that from students' perspective wiki encourages their participation in a group work and facilitates collecting and organizing information, while from teachers' viewpoint it simplifies managing students' work and monitoring of their progress. On the other hand, issues related to learning the wiki syntax, management of history logs, aesthetics of supported templates, consumption of server resources, and lack of commitment to regular use are considered to be the major obstacles that prevent students from embracing wiki as an educational tool [43]. In that respect, Ebner et al. [9] emphasized that research effort related to the use of wikis in educational context should be focused on revealing facets of usability and motivational aspects that contribute to their success.

Social Web applications for collaborative writing are designed to support concurrent work of multiple users on the same document. The main advantages of collaborative editors are simultaneous work on the same artefact, variety of functionalities that enable efficient formatting and editing of the content, and number of add-ons such as live chat, live markup and annotation etc., which significantly enhances and simplifies interaction among users [31]. Moreover, they enable monitoring who designed particular artefact and when facilitates artefacts management. Therefore, collaborative editors are commonly used for educational purposes. Serving as an effective replacement for the pen and paper, students can employ them for the purpose of taking notes during each lecture and lab-based exercise. Considering that social Web applications for collaborative writing have sharing functionality, students can supplement each other's notes, extend them with the content from literature in the field, and in that manner create educational materials which they will employ when preparing for the mid-terms and the final exam. Being a costless alternative to commercial office suites, students also use this type of social Web applications for the joint work on project documentation, preparing essays, participating in brainwriting sessions, creating various artefacts, etc. [4].

The aim of this paper is to explore facets of adoption in the context of social Web applications widely used in educational settings. The remainder of the paper is structured as follows. Brief overview of current advances in the field is offered in the next section. Employed research methodology is described in the third section. Study findings are presented and discussed in the fourth section. Concluding remarks are offered in the last section.

2 Background to the Research

White et al. [44] argue that the students' adoption of an application meant for conducting collaborative activities represents a strong determinant of successful completion of the group work in the virtual environment. Motivational factors that significantly contribute to the adoption of novel technologies in terms of users' continuance intentions are well-established in latest versions of Technology Acceptance Model (TAM) [40], Unified Theory of Acceptance and Use of Technology (UTAUT) [42], and Expectation-Confirmation Theory (ECT) [3]. However, only some of the forerunners of the aforementioned models have been enhanced and adapted to the context of collaborative Web applications and MOOCs. For instance, Liu [15] extended the original technology acceptance model with three new constructs (wiki self-efficacy, online posting anxiety, and perceived behavioural control) and discovered that wiki self-efficacy, perceived ease of use, perceived usefulness, and wiki use intention significantly affect wiki usage in the classroom. Drawing on the ECT, Alraimi et al. [1] explored factors that influence an individual's intention to continue to use MOOC. They found that perceived reputation, perceived openness, perceived usefulness and user satisfaction significantly affect continuance intentions related to the use of MOOCs.

In current studies on predicting adoption of social Web applications by students, TAM model has been enhanced with constructs from other relevant theories and models. For instance, Shiau and Chau [37] discovered that integrated model of ECT and TAM have greater power in explaining continuance intention related to the use of blogs than TAM alone. By using the Theory of Planned Behaviour (TPB) [39] as a foundation of their study, Taylor and Hunsinger [38] revealed significant positive interplay among attitude, subjective norms, control of behaviour and affect. As a follow up, Cheung and Vogel [5] combined constructs of TAM and TPB thus confirming significant impact of compatibility with existing tools and practices, perception of resources, self-efficiency and subjective norms on behavioural intentions to employ Google applications. White et al. [44] explored the ECT in the context of collaborative editors and confirmed that both perceived usefulness and satisfaction affect continuance intentions related to the use of Google Docs. By combining dimensions of TAM and ECT, Orehovački and Babić [22] found that confirmation of expectations, perceived usefulness, and perceived ease of use are strong predictors of satisfaction whereas satisfaction and perceived usefulness significantly contribute to continuance intentions when use of Google Docs is taken into account.

Apart from being solely focused on examining adoption, recent advances in the field are also dealing with evaluating quality of various social Web applications. For instance, Orehovački introduced a set of attributes that contribute to the success of Web 2.0 applications [32], proposed conceptual model together with subjective and objective

measuring instrument [30] meant for evaluating pragmatic and hedonic facets of quality in the context various social Web applications including mashups [24], mashup tools [27], services for mind mapping [20, 25, 26], diagramming [25, 32], and collaborative writing when they are employed in their native [20, 22, 30–32] and mobile settings [21] which all resulted in comprehensive evaluation methodology [29]. Finally, Orehovački and Žajdela Hrustek [28] found that learnability, satisfaction, and usefulness are important determinants of the usability of educational artefacts created by means of social Web applications.

All the aforementioned indicates that current studies are mainly focused on exploring the interplay of dimensions adopted from two diverse theories or models. In addition, studies which consider the adoption of different social Web applications employed in educational settings are scarce. Our aim is to introduce a framework whose facets originate from all relevant models and theories on technology acceptance and modelling users' behaviour and thus contribute to the adoption of social Web applications. Details on the proposed framework are provided in the following section.

3 Methodology

Procedure. The study was composed of two main parts: (1) interaction with two social Web applications and (2) the assessment of their adoption by means of the post-use questionnaire. The students' assignment was to collaboratively create an educational artefact. Students were free to choose the topic of the artefact and team members. Each student was asked to complete the aforementioned assignment twice – first with wiki tool integrated in the learning management system (LMS) Moodle and then using the Google Docs (depicted in Figs. 1 and 2, respectively). After completing the assignment with both social Web applications, the participants were asked to fill out the post-use questionnaire. The study was carried out as a part of the cMOOC on Foundations of Informatics.

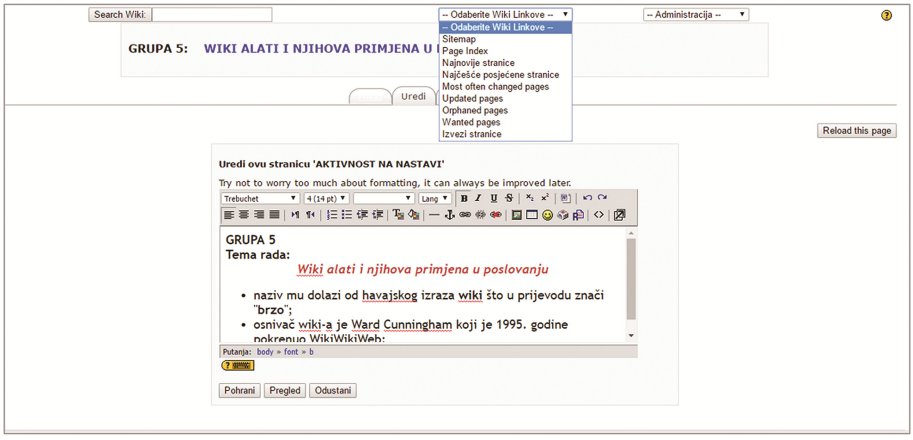

Fig. 1. Wiki tool in LMS Moodle

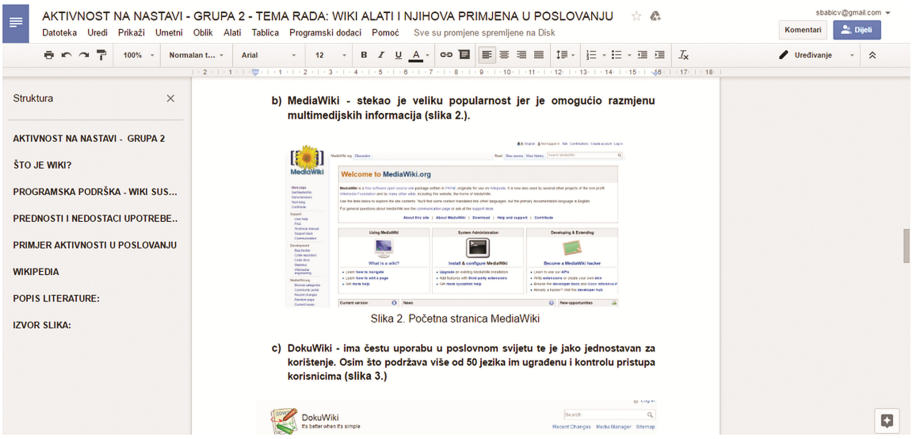

Fig. 2. Google Docs

Framework. The research framework consists of twelve constructs related to the adoption of social Web applications. Confirmation (CNF) refers to the extent to which social Web application has met users' expectations. Satisfaction (STF) denotes the degree to which users are content with using the social Web application. Perceived Usefulness (PU) signifies the extent to which using the social Web application enhances users' performance in performing assignments. Perceived Ease of Use (PEOU) refers to the degree to which using the social Web application is effortless. Behavioural Control (BCT) represents the extent to which users believe they will be able to conduct assignments by means of social Web application. Self-Efficacy (SEF) denotes the level to which users are self-confident in their abilities to employ social Web application. Anxiety (ANX) refers to a psychological state caused by negative experiences or expectations to lose self-esteem when confronting a situation in which users have to employ social Web application. Playfulness (PLY) denotes the degree to which the interaction with the social Web application holds the users' attention and stimulates their imagination. Continuance Intention (CIN) refers to the extent to which users have the intention to continue to use the social Web application. Hedonic Motivation (HMT) denotes the degree to which the use of social Web application arouses users' emotional responses. Habit (HBT) refers to the extent to which users tend to subconsciously employ social Web applications on regular basis. Functional Suitability (FUS) denotes the degree to which social Web application contains all functionalities required for completing collaborative activities.

Apparatus. The study adopted a within-subjects design comparing two social Web applications. Data was collected with the use of the post-use questionnaire that was administrated online by means of the KwikSurveys[1] questionnaire builder. The questionnaire comprised 13 items related to participants' demography and 55 items meant for measuring the dimensions of adoption. Items assigned to constructs were adopted

[1] https://kwiksurveys.com.

from existing models and tailored to the context of the research. Satisfaction and confirmation were measured by items adopted from Bhattacherjee [3], perceived usefulness and perceived ease of use were examined by items adopted from Davis [8] and Venkatesh et al. [41], continuance intention was explored by items adopted from Bhattacherjee [3] and Davis [8], self-efficacy and anxiety were evaluated by items adopted from Venkatesh et al. [41], habit and hedonic motivation were assessed by items adopted from Venkatesh et al. [42], playfulness was measured by items adopted from Moon and Kim [18], behavioural control was examined by items adopted from Taylor and Todd [39] whereas functional suitability was measured by items designed by authors of this paper. Responses to the questionnaire items were modulated on a four point Likert scale (1 – strongly disagree, 4 – strongly agree). Overall preference was assessed directly by an item in which users were asked to choose which of two employed social Web applications is more suitable for performing collaborative educational activities. The sum of responses to items assigned to corresponding construct was used as a composite measure which reflects particular dimension of adoption. Reliability of scales in terms of the internal consistency of introduced adoption constructs was examined with Cronbach's Alpha coefficient values. Differences between wiki and Google Docs were explored with Wilcoxon Signed-Rank Tests. The rationale behind the choice to employ this nonparametric equivalent to the dependent t-test relies on the outcomes of Shapiro-Wilk Tests which revealed that at least one of the variables in a pairwise comparison violates the assumption of normality in data ($p < .05$). Consequently, all the reported results are expressed as the median values. The effect size (r) was estimated as a ratio of Z-value and the square root of number of observations. According to Cohen [6], the values of .10, .30, and .50 indicate small, medium, and large effect size, respectively.

4 Results

Participants. Atotal of 190 subjects (48.95% male, 51.05% female) took part in the study. The sample was comprised of 69.47% full-time and 30.53% part-time first year undergraduate students enrolled in various study programmes at Polytechnic of Rijeka including Transport (34.74%), Entrepreneurship (13.68%), Information Science (18.42%) and Occupational Safety (33.16%). The age of students ranged from 18 to 49 years where 75.26% of them had between 18 and 20 years. After having completed collaborative educational activities with social Web applications, 91.57% and 96.74% of students reported that their level of knowledge related to the use of Google Docs and wiki is at least good, respectively. For the purposes of e-learning, 86.53% of students had used different social Web applications (blog, wiki, Google Docs or other) for at least one year. Majority (95.79%) of students are loyal users of Facebook. Finally, the participants use mobile devices (64.21%) and computers (53.68%) for more than three hours a day.

Findings. As outlined in Table 1, the Cronbach's alpha values ranged from .704 to .903, thus indicating sufficient reliability of scales for exploratory research [11].

Table 1. Reliability of scales

Constructs	Number of items	Cronbach's α[a]	
		Google Docs	Wiki
Anxiety	3	.751	.787
Behavioural control	3	.774	.744
Continuance intention	2	.825	.808
Confirmation	3	.847	.795
Functional suitability	9	.826	.831
Habit	4	.893	.871
Hedonic motivation	3	.877	.812
Perceived ease of use	6	.903	.861
Playfulness	6	.850	.841
Perceived usefulness	6	.886	.858
Self-efficacy	3	.724	.704
Satisfaction	3	.849	.832

[a]Threshold value in exploratory research [11] > .600

The outcomes of data analysis revealed that 28.42% and 30% of study participants are feeling anxious when they have to employ Google Docs and wiki, respectively, for the purpose of performing educational collaborative assignments. It was also discovered that 88.25% and 90.18% of students believe they have everything that is required to complete educational collaborative assignments by means of Google Docs and wiki, respectively. Moreover, it appeared that 72.90% and 66.32% of subjects is willing to continue using Google Docs and wiki, respectively, for collaborative work purposes. Results of data analysis also indicate that 83.33% and 86.49% of students reported that Google Docs and wiki, respectively, have met their expectations in the context of conducting educational collaborative assignments. In addition, 86.20% and 84.85% of study participants believe that Google Docs and wiki, respectively, have all functionalities that are needed for conducting collaborative activities. Only 33.42% and 33.95 of students claim they developed a habit of employing Google Docs and wiki, respectively, for conducting educational collaborative assignments. A total of 79.12% and 75.97% of respondents believe that using Google Docs and wiki, respectively, for educational collaborative activities is fun, interesting, and pleasant.

Data analysis also uncovered that 71.40% and 88.95% users reported that is easy to become proficient in using Google Docs and wiki, respectively. Furthermore, 59.04% and 56.58% of study participants think that interaction with Google Docs and wiki, respectively, can hold their attention for a longer period of time. It also appeared that 85.61% and 72.28% of subjects believe that using Google Docs and wiki, respectively, improves their performance in executing educational collaborative tasks. As much as 49.30% and 50.53% of students reported that they could complete educational collaborative assignments within time frame and without help of any kind when they employed Google Docs and wiki, respectively. Findings of the study also revealed that 85.26% and 87.02% of respondents claimed that interaction with Google Docs and wiki, respectively, represented a positive experience for them. Finally, when overall preference is

taken into consideration, 25.26% of students would recommend wiki to their peers, 30.53% of students would recommend Google Docs, while 44.21% of students would recommend both social Web applications for the purpose of conducting educational collaborative activities.

Although reported findings suggest that difference among evaluated social Web applications exist, Wilcoxon Signed-Rank Tests revealed that majority of them are not statistically significant. Namely, it appeared that significant difference between Google Docs and wiki exist only in terms of the construct that explores users' loyalty behaviour ($Z = -3.071$, $p = .002$, $r = -.16$). The reported effect is small in size. Results of Wilcoxon Signed-Rank Tests are summarized in Table 2.

Table 2. Outcomes of Wilcoxon Signed-Rank Tests

Constructs	Z	p	r	Median Values	
				Google Docs	Wiki
Anxiety	−1.700	.089	N/A	6.00	6.00
Behavioural control	−1.479	.139	N/A	9.00	9.00
Continuance intention	−3.071	.002	−.16[a]	6.00	6.00
Confirmation	−1.201	.230	N/A	9.00	9.00
Functional suitability	−1.085	.278	N/A	27.00	27.00
Habit	−.084	.933	N/A	9.00	9.00
Hedonic motivation	−1.512	.131	N/A	9.00	9.00
Perceived ease of use	−1.679	.093	N/A	18.00	18.00
Playfulness	−1.935	.053	N/A	15.50	16.00
Perceived usefulness	−.430	.667	N/A	18.00	18.00
Self-efficacy	−1.744	.081	N/A	7.00	7.00
Satisfaction	−.628	.530	N/A	9.00	9.00
Adoption	**−.993**	**.321**	**N/A**	**114.50**	**144.00**

[a]Wiki > Google Docs

5 Conclusions

When constructs that contribute to the adoption of social Web applications are taken into account, Google Docs and wiki are statistically similar environments for performing educational collaborative assignments and can be, therefore, employed as an alternative to one another. Although Google Docs has proved to be better social Web application than wiki with respect to adoption constructs that measure the extent of anxiety, functional suitability, hedonic motivation, playfulness and perceived usefulness, and wiki have reached better students' ratings regarding the constructs that measure the degree of behavioural control, expectations, habit, perceived ease of use, self-efficacy, and satisfaction, significant difference between these two social Web applications was found only in terms of the construct that examines the level of continuance intentions in favour of Google Docs. In addition, results of the item on overall preference indicate that majority of study participants would recommend both application for executing

collaborative assignments which further supports the aforementioned findings. Nevertheless, the proposed framework can be employed for exploring adoption of various types of social Web applications used in educational ecosystem.

As in the case of all empirical studies, work discussed in this paper has limitations. The first one is related to the homogeneity of study participants. Although students in our study are representative users of social Web applications, especially since they used these applications for completing educational assignments, heterogeneous sample could have provided importantly different responses. The second one concerns the generalizability of reported findings. Each social Web application has its particularities which might affect adoption constructs. Therefore, reported findings should be interpreted with caution.

In our future work we are planning to conceptualize an interplay of introduced adoption constructs and examine its psychometric features.

References

1. Alraimi, K.M., Zo, H., Ciganek, A.P.: Understanding the MOOCs continuance: the role of openness and reputation. Comput. Educ. **80**, 28–38 (2015)
2. Aparicio, M., Bacao, F.: E-learning concept trends. In: Proceedings of the 2013 International Conference on Information Systems and Design of Communication, pp. 81–86. ACM, Lisboa (2013)
3. Bhattacherjee, A.: Understanding information systems continuance: an expectation confirmation model. MIS Q. **25**(3), 351–370 (2001)
4. Bubaš, G., Ćorić, A., Orehovački, T.: The integration and assessment of students' artefacts created with diverse Web 22.0 applications. Int. J. Knowl. Eng. Soft Data Paradig. **3**(3), 261–279 (2012)
5. Cheung, R., Vogel, D.: Predicting user acceptance of collaborative technologies: an extension of the technology acceptance model for e-learning. Comput. Educ. **63**, 160–175 (2013)
6. Cohen, J.: Statistical Power Analysis for the Behavioral Sciences. Lawrence Erlbaum Associates, Hillsdale (1988)
7. Daradoumis, T., Bassi, R., Xhafa, F., Caballé, S.: A review on massive e-learning (MOOC) design, delivery and assessment. In: Proceedings of the 8th International Conference on P2P, Parallel, Grid, Cloud and Internet Computing, pp. 208–213. IEEE, Compiegne (2013). [27]
8. Davis, F.D.: Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Q. **13**(3), 319–340 (1989)
9. Ebner, M., Kickmeier-Rust, M., Holzinger, A.: Utilizing wiki-systems in higher education classes: a chance for universal access? Univ. Access Inf. Soc. **7**(4), 199–207 (2008)
10. Elgort, I., Smith, A.G., Toland, J.: Is wiki an effective platform for group course work? Australas. J. Educ. Technol. **24**(2), 195–210 (2008). [6]
11. Hair, J.F., Ringle, C.M., Sarstedt, M.: PLS-SEM: indeed a silver bullet. J. Mark. Theor. Pract. **19**(2), 139–151 (2011)
12. Kane, G.C., Fichman, R.G.: The Shoemarker's children: using wikis for information systems teaching, research, and publication. MIS Q. **33**(1), 1–17 (2009)
13. Kovačić, A., Bubaš, G., Orehovački, T.: Integrating culture into a business English course: students' perspective on a collaborative online writing project. In: Proceedings of the 23rd Central European Conference on Information and Intelligent Systems, pp. 195–202. Faculty of Organization and Informatics, Varaždin (2012)

14. Krebs, M., Ludwig, M., Müller, W.: Learning mathematics using a wiki. Procedia Soc. Behav. Sci. **2**(2), 1469–1476 (2010)
15. Liu, X.: Empirical testing of a theoretical extension of the technology acceptance model: an exploratory study of educational wikis. Commun. Educ. **59**(1), 52–69 (2010)
16. Mancinelli, E.: e-Inclusion in the information society. In: Information Society: From Theory to Political Practice: Coursebook. Gondolt–Új Mandátum, Budapest (2008)
17. McAuley, A., Stewart, B., Siemens, G., Cormier, D.: The MOOC model for digital practice (2010)
18. Moon, J.W., Kim, Y.G.: Extending the TAM for a world-wide-web context. Inf. Manag. **38**(4), 217–230 (2001)
19. Neumann, D.L., Hood, M.: The effects of using a wiki on student engagement and learning of report writing skills in a university statistics course. Australas. J. Educ. Technol. **25**(3), 382–398 (2010)
20. Orehovački, T., Babić, S., Jadrić, M.: Exploring the validity of an instrument to measure the perceived quality in use of Web 2.0 applications with educational potential. In: Zaphiris, P., Ioannou, A. (eds.) LCT 2014. LNCS, vol. 8523, pp. 192–203. Springer, Cham (2014). doi: 10.1007/978-3-319-07482-5_19
21. Orehovački, T., Babić, S.: Mobile quality of social web applications designed for collaborative writing. In: Zaphiris, P., Ioannou, A. (eds.) LCT 2016. LNCS, vol. 9753, pp. 368–379. Springer, Cham (2016). doi:10.1007/978-3-319-39483-1_34
22. Orehovački, T., Babić, S.: Predicting students' continuance intention related to the use of collaborative Web 2.0 applications. In: Proceedings of the 23rd International Conference on Information Systems Development, pp. 112–122. Faculty of Organization and Informatics, Varaždin (2014)
23. Orehovački, T., Bubaš, G., Kovačić, A.: Taxonomy of Web 2.0 applications with educational potential. In: Cheal, C., Coughlin, J., Moore, S. (eds.) Transformation in Teaching: Social Media Strategies in Higher Education, pp. 43–72. Informing Science Press, Santa Rosa (2012)
24. Orehovački, T., Cappiello, C., Matera, M.: Identifying relevant dimensions for the quality of web mashups: an empirical study. In: Kurosu, M. (ed.) HCI 2016. LNCS, vol. 9731, pp. 396–407. Springer, Cham (2016). doi:10.1007/978-3-319-39510-4_37
25. Orehovački, T., Granić, A., Kermek, D.: Evaluating the perceived and estimated quality in use of Web 2.0 applications. J. Syst. Softw. **86**(12), 3039–3059 (2013)
26. Orehovački, T., Granić, A., Kermek, D.: Exploring the quality in use of Web 2.0 applications: the case of mind mapping services. In: Harth, A., Koch, N. (eds.) ICWE 2011. LNCS, vol. 7059, pp. 266–277. Springer, Heidelberg (2012). doi:10.1007/978-3-642-27997-3_26
27. Orehovački, T., Granollers, T.: Subjective and objective assessment of mashup tools. In: Marcus, A. (ed.) DUXU 2014. LNCS, vol. 8517, pp. 340–351. Springer, Cham (2014). doi: 10.1007/978-3-319-07668-3_33
28. Orehovački, T., Žajdela Hrustek, N.: Development and validation of an instrument to measure the usability of educational artifacts created with Web 2.0 applications. In: Marcus, A. (ed.) DUXU 2013. LNCS, vol. 8012, pp. 369–378. Springer, Heidelberg (2013). doi: 10.1007/978-3-642-39229-0_40
29. Orehovački, T.: Development of a methodology for evaluating the quality in use of Web 2.0 applications. In: Campos, P., Graham, N., Jorge, J., Nunes, N., Palanque, P., Winckler, M. (eds.) INTERACT 2011. LNCS, vol. 6949, pp. 382–385. Springer, Heidelberg (2011). doi: 10.1007/978-3-642-23768-3_38
30. Orehovački, T.: Methodology for evaluating the quality in use of Web 2.0 applications, Ph.D. thesis, Faculty of Organization and Informatics, University of Zagreb, Varaždin (2013)

31. Orehovački, T.: Perceived quality of cloud based applications for collaborative writing. In: Pokorny, J., et al. (eds.) Information Systems Development – Business Systems and Services: Modeling and Development, pp. 575–586. Springer, Heidelberg (2011). doi: 10.1007/978-1-4419-9790-6_46
32. Orehovački, T.: Proposal for a set of quality attributes relevant for Web 2.0 application success. In: Proceedings of the 32nd International Conference on Information Technology Interfaces, pp. 319–326. IEEE Press, Cavtat (2010)
33. Parker, K.R., Chao, J.T.: Wiki as a teaching tool. Interdisc. J. Knowl. Learn. Objects **3**, 57–72 (2007)
34. Rajabi, H., Virkus, S.: The potential and readiness of Tallinn University to establish Massive Open Online Courses (MOOCs). Qual. Quant. Methods Libr. **4**, 431–439 (2013)
35. Rodriguez, O.: The concept of openness behind c and x-MOOCs (Massive Open Online Courses). Open Praxis **5**(1), 67–73 (2013)
36. Saadatmand, M., Kumpulainen, K.: Participants' perceptions of learning and networking in connectivist MOOCs. MERLOT J. Online Learn. Teach. **10**(1), 16–30 (2014)
37. Shiau, W.L., Chau, P.Y.: Understanding blog continuance: a model comparison approach. Ind. Manag. Data Syst. **112**(4), 663–682 (2012)
38. Taylor, C., Hunsinger, D.S.: A study of student use of cloud computing applications. J. Inf. Technol. Manag. **22**(3), 36–50 (2011)
39. Taylor, S., Todd, P.: Decomposition and crossover effects in the theory of planned behavior: a study of consumer adoption intentions. Int. J. Res. Mark. **12**, 137–156 (1995)
40. Venkatesh, V., Bala, H.: Technology acceptance model 3 and a research agenda on interventions. Decis. Sci. **39**(2), 273–315 (2008)
41. Venkatesh, V., Morris, M.G., Davis, G.B., Davis, F.D.: User acceptance of information technology: toward a unified view. MIS Q. **27**(3), 425–478 (2003)
42. Venkatesh, V., Thong, J.Y.L., Xu, X.: Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. MIS Q. **36**(1), 157–178 (2012)
43. Wei, C., Maust, B., Barrick, J., Cuddihy, E., Spyridakis, J.H.: Wikis for supporting distributed collaborative writing. In: Tools and Technology, pp. 204–209 (2005)
44. White, B.J., Brown, J.A.E., Deale, C.S., Hardin, A.T.: Collaboration using cloud computing and traditional systems. Issues Inf. Syst. **10**(2), 27–32 (2009)
45. Wulf, J., Blohm, I., Brenner, W., Leimeister, J.M.: Massive Open Online Courses. Bus. Inf. Syst. Eng. **6**(2), 111–114 (2014)