Je-LKS
Journal of e-Learning and Knowledge Society
The Italian e-Learning Association Journal
PEER REVIEWED PAPERS
Vol. 14, n.3, 2018
ISSN: 1826-6223 | eISSN: 1971-8829

EVALUATING THE IMPACT OF E-LEARNING ON STUDENTS` PERCEPTION OF ACQUIRED COMPETENCIES IN AN UNIVERSITY BLENDED LEARNING ENVIRONMENT

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Keywords: Blended learning, Student survey, Competencies, Higher education, Public administration program.

In the present study, the correlations between selected aspects of e-learning in the blended learning environment and the competencies students should acquire during their study are explored. The research was based on two different questionnaire-based surveys conducted among Faculty of Administration students. In the research 41 2nd year students of the university study programme were involved. We found that the problem-solving competency is highly correlated with the adequacy of e-learning. Our findings also suggest a high correlation between the computer skills competency and the usefulness of e-learning. The results could serve as a guide for the faculty management when further investigating how to enhance the students' competencies while employing modern solutions in the teaching process.

for citations:
Keržič D., Aristovnik A., Tomaževič N., Umek L. (2018), *Evaluating the Impact of e-learning on Students` Perception of Acquired Competencies in an University Blended Learning Environment,* Journal of e-Learning and Knowledge Society, v.14, n.3, 65-76. ISSN: 1826-6223, e-ISSN:1971-8829 - *DOI: 10.20368/1971-8829/1440*

1 Introduction

Development of information technologies indirectly called for the emergence of applications in various fields, such as e-commerce, e-banking, e-health, e-government and e-learning. E-learning systems are one of the most important online applications in the field of education, experiencing continuous and rapid development, and gaining an increasingly important place in public and private educational institutions, as well as in organizations offering education and training. Today, various stakeholders, such as students, trainers, academic staff and ICT staff, widely use web applications (Alsabawy, Cater-Steel & Soar, 2016; Islam, 2016).

Until now, there has not been so many free information sources available to anyone who wants to learn or supplement their knowledge in a particular subject. On the internet, the access is immediate and possibilities are infinite. Not only have interactions between learner and teacher become easier and more efficient, but the time and space limitations are also significantly mitigated. Nowadays, Internet access guarantees the possibility of a world-class education at minimal, if not zero, costs (Aparicio, Bacao & Oliveira, 2017).

Today's societies encounter globalization and modernization where everything is changing fast. Educational institutions face the challenge of educating their students to be well prepared to function in such varying and complex situations. Nowadays, mere mastery of knowledge is losing in importance while the skills learned by the individual and the competencies they acquire are ever more appreciated. The literature shows the terms "competence" and "competency" are sometimes synonyms while other times their meaning varies (Kennedy, Hyland & Ryan, 2009). In the article, competency refers to a person's individual combination of knowledge, skills, attitudes, thought patterns, and motives that when appropriately applied, singularly or in various combinations, result in successful performance for achieving preferred outcomes. Opposite, "competence" is a state of being able to do certain task.

The European Key Competences Reference Framework (European Council, 2009) defines eight core competencies and five of them are cross-curricular competencies: digital competency, learning to learn, social and civic competencies, sense of initiative and entrepreneurship, and cultural awareness and expression. In higher education, the Bologna reform foregrounds competency-based academic education highlighting learning objectives, learning outcomes and competencies, which allow comparability between studies from all over Europe as well as the mobility of students and teachers. But, this also requires a reorganization of examinations in higher education – measuring the level of competency acquired, which could be regarded the pending task in the European higher education area (e.g. Zawacki-Richter,

Hanft & Bäcker2011).

The purpose of the paper is to identify possible relations between students' opinions on specific aspects of e-learning and their self-assessment regarding the level of competencies they have acquired. The paper presents the strength of that correlation and suggests induces how the results could be taken into account when thinking about potential improvements or significant changes in teaching methods at Faculty of Administration.

The paper is structured as follows: after the introduction, which includes a description of the problem and the paper's purpose, a brief literature review on different aspects of blended learning and competencies is presented, followed by the description of data, used methodology and obtained results of our empirical study. At the end, conclusions are offered based on the examined data, accompanied by the study's limitations and plans for our future research.

2 Literature Review

In the last 15 years, the focus in education has shifted from teaching itself towards learning and competencies on the students' side. In the European Higher Education Area (EHEA) students are placed at the heart of the education model and the concept of competency becomes one of the main elements of the learning process. Hence, previous learning model focused on content is transformed into a competence-focused model, which implies a radical change in the learning process. Students are expected to build their own knowledge by searching and processing information. The teacher no longer just spreads the knowledge as it takes up several roles and the process, such as instructor, moderator, coach, collaborator, and organizer (Donnelly, 2004; Fito-Bertran, Hernandez-Lara & Seradell-Lopez, *op. cit.*).

The new concept brought into classrooms is competency-based learning, ensuring students gain skills that seem important for their adult life and career. In this way, the academic world is coming closer to the professional world (Fito-Bertran, Hernandez-Lara & Seradell-Lopez, *op. cit.*). According to Gonzalez and Wagenaar (2003, p. 15), competencies are "…underlying characteristics of a person that are coincidentally related to good or excellent performance at work". Competencies can be divided into two types: specific and generic (Fito-Bertran, Hernandez-Lara, & Seradell-Lopez, *op. cit.*; Gonzalez & Wagenaar, *op. cit.*). Students in higher education acquire not only specific skills and particular knowledge of the field under study but also generic competencies which are common and comparable among different study programmes. Generic competencies are those not necessarily related to a specific subject, such us critical thinking, problem-solving, decision-making, teamwork, logical thinking, finding and managing information, effective communication in the

mother and at least one foreign language. Since competencies are generally obtained during the educational process in different courses, they are related to the educational programme. Instead of credits-based education programmes, in the new competency-based concept obtained skills, abilities and knowledge – competencies – are measured. The Tuning final report on the educational structure in the EU stated that "Credits as such are not a sufficient indication of learning achievements. The only reliable way to compare pieces of learning and study programmes offered by (higher) education institutions is to look at learning outcomes/competencies" (Gonzalez & Wagenaar, 2003, p. 45).

The competency-based learning requires different learning approaches, where students become active stakeholders in the learning process, and not just passive learners, and where students independently develop new skills and knowledge (Dunning, 2014; Fito-Bertran, Hernandez-Lara & Seradell-Lopez, 2014). In general, faculties do not drastically change their teaching methods to follow the competency-based concept of learning where, ideally, every student has the opportunity to achieve knowledge and skills to be successful in a competitive society. In recent years, a noticeable change in higher education institutions is the integration of various learning management e-learning systems to support the educational process allowing students to learn at their own pace and facilitates without time or space constraints between teachers and colleagues. Dunning (*op. cit.*, p. 66) concludes that "the delivery of a course, usually by the same professor over many years and in the confines of a classroom, is being overtaken by online delivery of the same course by multiple professors".

Because of the important role of e-learning systems in education, industry, and society scientific studies about various aspects of e-learning systems were conducted recently. Several studies have focused on either factors influencing e-learning (e.g. Novo-Corti, Varela-Candamio & Ramil-Diaz, 2013; Upadhyaya & Mallik, 2013) or the consequences of e-learning, e.g. student performance (e.g. Fryer & Bovee, 2016; Joo, Joung & Son, 2014) or their satisfaction with e-learning (e.g. Novo-Corti, Varela-Candamio & Ramil-Diaz, *op. cit.*; Sun *et al*., 2008), especially with its usefulness (e.g. Alsabawy, Cater-Steel & Soar, 2016). Recently, gamification is used as one of the ways in online learning environment. Among the researchers, the subject of surveys is also the acquisition of competencies in e-learning compared to face-to-face. For example, in their research, Fito-Bertran, Hernandez-Lara, and Seradell-Lopez (*op. cit.*) found that (generic and managerial specific) competencies acquired by students via a business game are assessed as higher when students learn online compared to face to face. Similar conclusions have been made in the field of medical and nursing studies (e.g. Reime *et al*., 2008), where various software for virtual reality offers simulations, virtual patients and clinical scenarios,

and immediate access to information and educational materials (for example clinical images, anatomical atlas...), which enables efficient and personalized learning to assess the clinical skills and reasoning of medical students. In the research, Galbis-Córdova, Martí-Parreño and Currás-Pérez (2017) found that students' attitude towards gamification is related to whether the game draws one's attention, the ability to change difficulty of the game according to one's abilities and, last but not least, one must perceive the importance of the game for acquiring competencies.

3 Empirical Study

The research presented here was conducted among students of the Faculty of Administration (FA), which is part of the University of Ljubljana, Slovenia. The FA educates students in the field of administrative science. The Faculty offers two undergraduate study programmes (1st cycle) – University Study Programme in Public Sector Governance and a Higher Education Professional Study Programme in Administration. Both programmes are provided in a combination of traditional face-to-face teaching and e-courses where LMS Moodle has been used for e-learning since 2009.

The present study aims to analyse two long-running surveys (students' evaluation of e-learning aspects and their evaluation of the competencies acquired) at the FA and to find links between them. Since both surveys depend on students' opinions, we added an objective performance measure, namely students' average grade. For each individual student who participated in our survey, we collected 7 opinions on e-learning, 25 opinions on the level of competencies acquired and the average grade for all exams a student had passed.

3.1 Data

Our data originate from two different questionnaires; one on competencies and the other on aspects of e-learning. The survey on competencies is based on a questionnaire initially intended for FA graduates. Part of this questionnaire comprises a list of 25 competencies students should acquire during their studies (Table 1).

Table 1
LIST OF COMPETENCIES INCLUDED (S – SPECIFIC, G – GENERIC)

Label		Description
C1	S	Professionalism and practical experience in the field of administration.
C2	S	Knowledge of and dealing with research methods and procedures in the field of social sciences.
C3	G	Ability to analyse, synthesize and anticipate solutions and consequences of a phenomenon.
C4	S	Ability to be critical or self-critical in social issues.
C5	G	Ability to obtain maximum results in negotiations.
C6	G	Ability to keep functioning effectively when under pressure.
C7	G	Ability to take advantage of an opportunity, being proactive.
C8	G	Ability to coordinate activities (in a team).
C9	G	Ability to efficiently use time.
C10	G	Ability to cooperate productively in a team.
C11	G	Ability to motivate people (and move toward a common goal).
C12	G	Ability to speak clearly and be easily understood.
C13	G	Ability to establish own authority.
C14	G	Skills in the use of information (from the Internet) and communications technologies.
C15	G	Capacity to generate new ideas and solutions.
C16	G	Ability to discuss values in approaches, ideas, and solutions of oneself and others.
C17	G	Ability to solve problems.
C18	G	Ability to make business decisions autonomously.
C19	G	Ability to present ideas, arguments, ideas, or reports clearly and concisely.
C20	S	Ability to write reports, records, and documents in the administration.
C21	G	Ability to communicate verbally and in writing in at least one foreign language.
C22	S	Professional knowledge of other countries in the fields of economics, society and the law.
C23	G	Knowledge of cultural differences.
C24	G	Ability to work with people from different cultural backgrounds.
C25	S	Ability to assess acts and practices in accordance with professional ethics in administration.

We asked students to express their opinions on the competencies they had acquired on a 6-level scale from 1 (“not acquired at all”) to 6 (“fully acquired”).

The second data source is a questionnaire-based survey started in 2014 at the FA (see Aristovnik, Tomaževič, Keržič & Umek, 2017). Once a semester we ask our students to evaluate several aspects of e-courses in which they are enrolled. In addition to questions about a specific e-course, the questionnaire includes several general statements about e-learning. This part of the questionnaire is therefore used for our survey. The list of these selected aspects is shown in Table 2.

Table 2
ASPECTS ABOUT E-LEARNING

Label	Description
A1	Working with computers for study purposes suits me.
A2	The Moodle e-learning system is easy to use.
A3	The Moodle system is reliable and stable (it does not crash, submitted tasks are not lost).
A4	I am satisfied with the support and assistance in the event of technical problems.
A5	Working with computers for study purposes is not difficult for me.
A6	E-learning contributes to higher student academic performance.
A7	E-learning is a quality replacement for traditional learning in the classroom.

The students expressed their opinions on the statements in Table 2 on a seven-point Likert scale from "completely disagree" (value 1) to "completely agree" (value 7). Students can also choose N ("do not know") or even to not respond at all since survey participation is not obligatory. Missing responses and the value of N in the survey analysis are considered as missing values and were excluded from the study.

During the 2016/17 academic year, 2nd year students of the university study programme were involved in the research. Our population of interest were 84 students, 51 (61%) of them participated in the survey on competencies and 45 (54%) in the survey of aspects of e-learning; 41 (49%) participated in both surveys. Student voluntarily participated in the survey, without any coercion or undue influence. Both questionnaires (on competencies and on aspects of e-learning) were carried out on-line. In both surveys, we ask them students for their student ID number to help us link the obtained results with various sources. Data from both questionnaires answered by 41 students were analysed. Basic demographic properties of our data set are:

- Gender: male 34%, female 66%;
- Region: Ljubljana 56%, outside Ljubljana 41%, abroad 2%;
- High school final grade: sufficient (2) 44%, good (3) 44%, very good (4) 7%, excellent (5) 5%.

3.2 Methodology and Empirical Results

We calculated 175 Spearman's correlation coefficients between 25 competencies (C1…C25) and 7 aspects (A1…A7) of e-learning and 32 correlations between the average grade (AG) and all competencies and aspects of e-learning. Altogether, we computed 207 Spearman's correlations and corresponding p-values. Due to the large number of hypotheses tested, we adjusted p-values using a False Discovery Rate (FDR) correction (Yoav &

Hochberg, 1995). For a FDR level of 0.2, we found 27 significant correlations (14% of all pairs we analysed).

Table 3 shows 27 significant correlations (Spearman's r) between analysed competencies (C1…C25), aspects of e-learning (A1…A7) and the average grade (AG) and corresponding significances (Sig.).

Table 3
SIGNIFICANT CORRELATIONS (R) BETWEEN ANALYSED COMPETENCIES (C1...C25), ASPECTS OF E-LEARNING (A1...A7), AND THE AVERAGE GRADE (AG)

Pair	r		Sig.	Pair	r		Sig.	Pair	r		Sig.
C21	AG	0.601	3.29E-05	A1	AG	0.440	0.004	C4	A1	0.396	0.010
C17	A1	0.584	6.06E-05	C16	A1	0.437	0.004	C7	A1	0.386	0.013
C14	A6	0.549	2.03E-04	C16	AG	0.435	0.004	C15	AG	0.380	0.014
C19	AG	0.541	2.59E-04	C18	A6	0.433	0.005	C5	A5	0.370	0.017
C21	A1	0.533	3.37E-04	C6	AG	0.431	0.005	C24	A1	0.365	0.019
C12	AG	0.517	0.001	C4	AG	0.422	0.006	C5	AG	0.361	0.021
C8	AG	0.479	0.002	C6	A1	0.413	0.007	C13	A6	0.359	0.021
C15	A1	0.474	0.002	C21	A2	0.412	0.007	C25	A3	-0.356	0.023
C15	A6	0.454	0.003	C25	A6	0.408	0.008	C24	A5	0.352	0.024

The strongest correlation we discovered was between the competency of "speaking, reading, and writing in a foreign language" (C21) and average grade (AG). The correlation coefficient of r=0.601 indicates that students who think their competencies of communicating in a foreign language are good tend to have higher average grades. The correlation is significant (p=3.3E-5).

The second pair indicated quite a strong positive correlation (r=0.584) between the competency of "solving problems" (C17) and the aspect of "suitability of working with computers in the study process" (A1). This means that students who like using computers for studying think they are good at solving problems. The correlation is significant (p=6.1E-5).

The last pair we describe in more detail is the correlation of r=0.549 between the competency "using information and communications technologies" (C14) and aspect "contribution of e-learning to academic performance" (A6). This means that students who think that e-learning contributes to their better performance (i.e. high grades, lower number of admissions to exams) have a higher ability to work with computers and use information from the Internet. The correlation is significant (p=2.0E-4).

To summarize other significant findings we present two tables. In Table 4, we list all seven aspects of e-learning from our survey and the number of

significant associations with competencies and average grades. For each aspect, we list competencies with a significant correlation and determine its correlation with the average grade.

Table 4
All Aspects of e-Learning from the Survey and Significant Correlations with Competencies and Association with Average Grade

Aspect of e-learning	Significant competencies	Association with AG
A1	C17, C21, C15, C16, C6, C4, C7, C24	Yes
A6	C14, C15, C18, C25, C13	No
A5	C5, C24	No
A2	C21	No
A3	C25	No
A4	0	No
A7	0	No

Table 4 indicates that the "suitability of working with computers in the study process" (A1) is strongly linked to eight competencies, including "solving problems" (C17) (r=0.584, p=6.1E-5), "speaking, reading, and writing in a foreign language" (C21) (r=0.53, p=3.3E-4) and "generating new ideas and solutions" (C15) (r=0.47, p=1.7E-4). All other correlations are positive and exceed 0.3. This aspect is also significantly correlated to the average grade (r=0.44, p=4.0E-4).

The second most influential aspect of e-learning was "contribution to academic performance" (A6), significantly linked to five competencies but not to the average grade. The significant competencies include "using information and communications technologies" (C14) (r=0.549, p=2.0E-4), "generating new ideas and solutions" (C15) (r=0.545, p=2.8E-4) and "ability to make autonomous business decisions" (C18) (r=0.433, p=4.6E-4).

The other aspects of e-learning resulted in less significant associations. Two of them, "satisfaction with technical support" (A4) and "replacement of face-to-face learning" (A7), produced no significant results. Table 5 presents 16 (out of 25) competencies with at least one significant correlation with either aspects of e-learning or the average grade.

Table 5
COMPETENCIES WITH SIGNIFICANT CORRELATIONS WITH EITHER ASPECTS OF E-LEARNING OR THE AVERAGE GRADE

Competency	Significant aspect of e-learning	Significant association with AG
C21	A1, A2	Yes
C15	A6	Yes
C24	A1, A5	No
C25	A3, A6	No
C16	A1	Yes
C4	A1	Yes
C5	A5	Yes
C6	A1	Yes
C14	A6	No
C17	A1	No
C18	A6	No
C13	A6	No
C7	A1	No
C12		Yes
C8		Yes
C19		Yes

Conclusion

The Bologna Process introduced a common European area of higher education, which called for many changes to be made at European universities. Due to the comparability of studies across Europe and the mobility of students and teachers, the focus in learning is shifting to competencies and skills based on knowledge. Knowledge alone is not enough – what is also important is which (professional) skills and competencies a student acquires and how they are able to use them. This, of course, has affected educational methods and student performance evaluations. We can certainly expect that education will increasingly take place in e-learning. Therefore, if we want e-learning to be successful, we need to understand the affecting factors.

In our study, we explored the correlations between the selected aspects of e-learning in the Moodle environment and the competencies students should acquire during their study. The research was based on two different questionnaires administered to Faculty of Administration students. We found that the competency of problem-solving is highly correlated to the adequacy of e-learning. One of the major problem we are facing in voluntary participation

in survey research is the low responsiveness of our students, which was evident also in this case. This holds especially for students with lower grades – in the future we will pay more attention to motivate them to overcome potential bias in our sample. On the collected data, the survey results showed that the competency of problem-solving is highly correlated to the adequacy of e-learning. Our findings also suggest a strong correlation between the competency of computer skills and the usefulness of e-learning. Indeed, one of the main pre-conditions for benefitting from e-learning system use is that students have higher abilities in working with computers and using information from the Internet.

Our study's main limitation is measuring the level of competencies acquired. The recent measurement is based on self-evaluation which can produce biased results: some students overestimate their abilities while others underestimate them. Future work will focus on more objective measurements. One possible improvement will be to analyse competencies from course syllabuses and to link the listed competencies with grades in various courses. It will be also more relevant to ask the students about the level of competency acquired in the last year of study since our questionnaire was based on the survey, initially focussed on graduates. Nevertheless, the results we obtained could serve as a guide for faculty management when further investigating how to enhance students' competencies while employing modern solutions in the teaching process.

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