

TRAINING EFFECTIVENESS AND USER EXPERIENCE OF EDUCATION TEACHER TRAINING OF AN OPEN SOURCE LMS USING THIS LMS

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Abstract

E-Learning is another way of teaching and learning, conducted mainly via the Internet. Most of the pedagogical principles that apply to the traditional classroom delivery method also apply to e-Learning, but these principles need to be extended.

The views of forty-five (45) teachers, who participated in the large scale training programme for a specific Learning Management System (LMS) (Open eclass) using the same system, have been recorded via the use of a Likert five-scale questionnaire on the Usefulness, the Ease in Use, the Ease in Learning and the Satisfaction as far as this system is concerned.

These four factors are considered in this work to determine the overall user experience. In the research it was found that the majority of those questioned stated that the specific LMS is characterized by Usefulness, Ease in Use, Ease in Learning and Satisfaction. It is worth noticing that although these four factors are interrelated, this is not the case with the demographic characteristics of the specimen.

In addition, it was found that from Primary and Secondary Education Greek teachers, those who seek their general participation in training programs, especially those related to new technologies, are those who hold a postgraduate degree. Also, they are somewhat above the average of their careers and they serve in Secondary Education, teaching Physical Sciences and they have not attended any other relevant training in this Learning Management System.

Keywords: Teacher training, long distance education, Learning Management System, Open eClass.

1 INTRODUCTION

The increasing popularity of the Internet and WWW has affected different aspects of life, one of which is learning, resulting in many online activities influencing traditional learning ([1]).

E-learning is technology-based learning, such as computer-based learning, web-based learning, virtual classroom, and digital collaboration ([2]). E-learning describes the ability to electronically transfer, manage, support, and supervise learning and educational materials ([3], [4]). A Learning Management System (LMS) is a way to implement e-learning, due to the fact that it offers several methods of diffusing information and knowledge among participants of an on-line course ([5]) and allows instructors to deliver assignments to students, produce and publish course educational material, prepare tests, to mention but a few ([6]).

E-learning includes both formal and non-formal education. It is not intended to replace the traditional way of learning but to complement the educational process. Its purpose is to solve problems and offer new opportunities in which traditional education does not exist, giving new prospects.

There are three conceptions of teaching using the Web ([7]): (a) as a source of information leaving teachers to just upload lecture notes, papers, etc.; and direct students to websites for subject resources, (b) for individual and independent self-paced learning: the Web is seen as a space that may provide the opportunity of being engaged with subject analysis or subject drills that could lead to learning, and (c) for group analysis, decision making and dialogue: the Web is seen as a space in which learning relationships may be developed.

More and more teachers use LMSs to enhance their teaching methods ([8]). Asynchronous education or distance learning helps teachers and learners to overcome limitations of typical teaching such as space and time, and it also allows for a personalized learning on the part of the learner ([9]).

The paper opens with a brief description of the main research directions in relation to the concept of e-learning. Then, a description of electronic classroom service follows. Next, the methodology section gives an insight into the structure of the questionnaire and into present research hypotheses. The sample's socio-demographic profile and main findings of the survey in relation to the relevant parts of the questionnaire are presented in the analysis section. Finally, the paper closes with a summary of the main findings of the survey.

2 E-CLASS DESCRIPTION

Greek School Network – GSN ([10]) uses the Open eClass e-learning platform ([11]) which is an extended version of the Claroline LMS ([12]). This platform is called electronic classroom service (e-class) and is available at <http://eclass.sch.gr/>

Open eClass, as one of the existing e-Learning platforms, is a software package for producing Internet-based courses. It is similar to the Moodle platform, thus being a virtual learning environment that provides means, which allow users to perform learning tasks ([13]). Administrators and teachers can design courses and offer tools to perform a variety of activities and present them on the platform. These courses can be divided into sections to organize the students' work. Each section may contain as many activities and resources as the teacher desires.

Open eClass, and especially the e-class service of GSN, offers a number of ways to share content by adding resources. A resource is an item teachers can use to support learning. There are twenty four (24) different modules in Open eClass: (i) Documents, (ii) Announcements, (iii) Exercises, (iv) Gradebook, (v) Agenda, (vi) Glossary, (vii) Learning path, (viii) Concept map, (ix) Assignments, (x) Questionnaire, (xi) E-book, (xii) Blog, (xiii) Chat, (xiv) Messages, (xv) User Groups, (xvi) Course Description, (xvii) Multimedia, (xviii) Progress, (xix) Forum, (xx) Links, (xxi) Wiki, (xxii) Wall, (xxiii) Teleconference and (xiv) Attendance.

3 METHODOLOGY

In this study, an education training program was designed, developed and implemented on a large scale. The program is called "Learning Management System: e-Class" and for the purposes of the program, an electronic course (e-course) was created on the aforementioned platform. This electronic course lesson is available at <http://eclass.sch.gr/courses/9480072101/> and its homepage is shown in the following figure (Fig. 1).

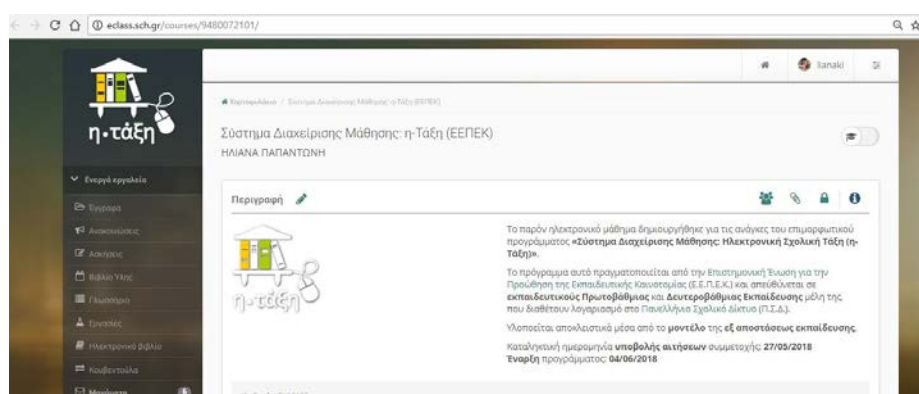


Figure 1 Screenshot of e-course "Learning Management System: e-Class".

3.1 Aim

The aim of this study was to record the views of teachers on the subject of electronic classroom service (e-class) provided by GSN, after successfully completing an education teacher training of an open source LMS using this LMS. The program is called "Learning Management System: e-Class".

3.2 The questionnaire

For the purposes of the present study, an electronic questionnaire, which was created via Google Forms, was sent to all the participants.

The questionnaire "USE" ([14]) was used for this study. The specific questionnaire was translated into Greek. Then, two experts in ICT in education were invited to review the questionnaire and it was pilot tested with five primary and secondary education teachers.

The questionnaire consists of two main sections. The purpose of the first section was to collect socio-demographic data. For this reason, participants were required to provide their demographic information like gender, age, teaching experience, etc., as it is shown in Table 1.

The second section contains 30 questions about the assessment of e-class service of GSN in four axes: (a) Usefulness, (b) Ease of Use, (c) Ease of Learning and (d) Satisfaction. This part of the questionnaire was based on the questionnaire "USE". The items of this section were adopted and modified to suit with the electronic classroom service (e-class) provided by GSN. Each participant completed the second part of the questionnaire on the agreement or disagreement in a five (5) Likert-type questionnaire.

3.3 Research hypotheses

The research hypotheses based on the "USE" model in the context of the electronic classroom service (e-class) provided by GSN are:

- H1: Perceived usefulness has a significant effect on perceived satisfaction.
- H2: Perceived ease of use has a significant effect on perceived satisfaction
- H3: Perceived ease of learning has a significant effect on perceived satisfaction.
- H4: Perceived usefulness has a significant effect on perceived ease of learning.
- H5: Perceived ease of use has a significant effect on perceived ease of learning.
- H6: Perceived usefulness has a significant effect on perceived ease of use.

4 RESULTS

4.1 Participants

All the 79 teachers, who successfully completed the education teacher training program, were invited to take part in the study. The return rate of the questionnaires was 57.0% of those teachers. There weren't incomplete questionnaires, due to the fact that the teachers were asked to complete an electronic form. Consequently, the sample consisted of 45 teachers. On Table 1, the demographic profile and descriptive statistics of the forty five (45) responders are summarized.

More than half (62.2%) were female, aged from 31 to 61 years old (mean age 47, standard deviation age 7.8), with postgraduate studies (46.7%), working in secondary education schools (73.3%) in Attica region (24.4%), teaching from 1 to 31 years (mean 19.98, standard deviation age 7.8) and teaching Physical Sciences (15.6%). They reported that they hadn't attended any previous related training program (88.9%).

4.2 Data analysis

All statistical analyses were performed using SPSS. Data analysis was consisted of the following three methods: (a) descriptive statistics (means, standard deviations) were used for all the variables of the questionnaire, (b) Cronbach's alpha was calculated for each scale of the "USE", (c) the relationships among the components of the "USE" were determined by using Person correlation coefficients and by regression analysis.

Table 1. Sample demographic profile.

<i>Gender</i>	<i>Frequency</i>	<i>Percent (%)</i>	<i>Greece regions</i>	<i>Frequency</i>	<i>Percent (%)</i>
Male	17	37.8	Attica	11	24.4
Female	28	62.2	Central Macedonia	8	17.8
Education level	Frequency	Percent (%)	Eastern Macedonia and Thrace	3	6.7
Postgraduate	21	46.7	Western Macedonia	3	6.7
University	18	40.0	Epirus	2	4.4
Pedagogical Academy	2	4.4	Thessaly	7	15.6
T.E.I.	3	6.7	Ionian Islands	1	2.2
Other	1	2.2	Western Greece	1	2.2
School	Frequency	Percent (%)	Southern Aegean Islands	3	6.7
Secondary	33	73.3	Central Greece	3	6.7
Primary	12	26.7	Northern Aegean Islands	1	2.2
Attending previous related courses	Frequency	Percent (%)	Crete	2	4.4
Yes	5	11.1			
No	40	88.9			
	mean	s.d.		mean	s.d.
Age	46,49	7,57	Teaching experience	19.98	6.56

4.3 Findings

4.3.1 Descriptive statistics

Table 2 presents descriptive statistics (means (M) and standard deviations (SD)) among the items of the "USE". The majority of means scores were greater than 4. These results of the descriptive analysis show that most of the teachers had positive scores for "USE" variables.

In relation to the usefulness of the specific service of the GSN, the percentages of teachers who agree (mostly or fully) are: (i) 82.3% about the fact that e-class helps them be more effective, (ii) 86.7% about the fact that e-class helps them be more productive, (iii) 93.3% about the fact that e-class is useful, (iv) 75.5% about the fact that e-class gives them more control over the activities in their life, (v) 82.2% about the fact that e-class makes the goals they want to accomplish easier to get done, (vi) 62.2% about the fact that e-class saves them time when they use it, (vii) 77.8% about the fact that e-class meets their needs and (viii) 77.8% about the fact that e-class does everything they would expect it to do.

Table 2. Descriptive statistics for the "USE" questions

		<i>M</i>	<i>SD</i>			<i>M</i>	<i>SD</i>
U01	E-class helps me be more effective.	4.1	0.7	EU08	I don't notice any inconsistencies as I use e-class.	4.0	0.6
U02	E-class helps me be more productive.	4.2	0.7	EU09	Both occasional and regular users would like e-class.	4.0	0.6
U03	E-class is useful.	4.5	0.6	EU10	I can recover from mistakes quickly and easily.	4.0	0.7
U04	E-class gives me more control over the activities in my life.	4.0	0.9	EU11	I can use e-class successfully every time.	4.0	0.8

U05	E-class makes the things I want to accomplish easier to get done.	4.1	0.8	EL01	I learned to use e-class quickly.	4.3	0.6
U06	E-class saves me time when I use it.	3.8	1.0	EL02	I easily remember how to use e-class.	4.0	0.7
U07	E-class meets my needs.	4.0	0.7	EL03	It is easy to learn to use e-class.	4.2	0.6
U08	E-class does everything I would expect it to do.	3.9	0.7	EL04	I quickly became skillful with e-class.	4.1	0.8
EU01	E-class is easy to use.	4.2	0.6	S01	I am satisfied with e-class.	4.2	0.6
EU02	E-class is simple to use.	4.2	0.7	S02	I would recommend e-class to a friend.	4.5	0.6
EU03	E-class is user friendly.	4.2	0.6	S03	E-class is fun to use.	4.1	0.8
EU04	E-class requires the fewest steps possible to accomplish what I want to do with it.	3.8	0.8	S04	E-class works the way I want it to work.	3.7	0.7
EU05	E-class is flexible.	3.9	0.7	S05	E-class is wonderful.	3.8	0.8
EU06	Using e-class is effortless.	3.6	1.0	S06	I feel I need to have e-class.	3.9	0.6
EU07	I can use e-class without written instructions.	3.3	1.1	S07	E-class is pleasant to use.	4.2	0.6

In relation to the ease of use of the specific service of the GSN, the percentages of teachers who agree (mostly or fully) are: (i) 91.1% about the fact that e-class is easy to use, (ii) 86.7% about the fact that e-class is simple to use, (iii) 88.9% about the fact that e-class is user friendly, (iv) 66.7% about the fact that e-class requires the fewest steps possible to accomplish what they want to do with it, (v) 73.3% about the fact that e-class is flexible, (vi) 64.4% about the fact that using e-class is effortless, (vii) 51.1% about the fact that they can use e-class without written instructions, (viii) 80.0% about the fact that they don't notice any inconsistencies while using e-class, (ix) 84.5% about the fact that both occasional and regular users would like e-class, (x) 80.0% about the fact that they can recover from mistakes quickly and easily and (xi) 77.8% about the fact that can use e-class successfully every time.

In relation to the ease of learning of the specific service of the GSN, the percentages of teachers who agree (mostly or fully) are: (i) 91.2% about the fact that they learned to use e-class quickly, (ii) 80.0% about the fact that they easily remember how to use e-class, (iii) 93.3% about the fact that it is easy to learn to use e-class and (iv) 77.8% about the fact that they quickly became skillful e-class users.

In relation to the satisfaction of the specific service of the GSN, the percentages of teachers who agree (mostly or fully) are: (i) 86.7% about the fact that they are satisfied with e-class, (ii) 95.5% about the fact that they would recommend e-class to a friend, (iii) 75.6% about the fact that e-class is fun to use, (iv) 60.0% about the fact that e-class works the way they want it to work, (v) 62.2% about the fact that e-class is wonderful, (vi) 73.4% about the fact that they feel they need to have an e-class and (vii) 88.9% about the fact that e-class is pleasant to use.

4.3.2 Cronbach's alpha

Reliability refers to the extent to which a questionnaire yields the same results under consistent conditions ([15]). It is most commonly measured using Cronbach's alpha, which is a measure of internal consistency ([9]). For the dataset, there was a good internal consistency; Cronbach's alpha=0.926. Same results derived for the "USE" factors: Usefulness (U) alpha=0.899, Ease of Use (EU) alpha=0.824, Ease of Learning (EL) alpha=0.860 and Satisfaction (S) alpha=0.870.

4.3.3 Person correlation coefficients

Table 3 shows that the Pearson correlations among the "USE" factors were positive. At first, it is interesting to notice that all "USE" factors are intercorrelated, having not only high but also significant correlation, especially the correlations that ranged from 0.382 to 0.629. Satisfaction ($r=+0.588$, $p<0.01$) had the strongest correlation with perceived usefulness, followed by perceived ease of use ($r=+0.382$, $p<0.01$) and perceived ease of learning ($r=+0.311$, $p<0.05$). Perceived ease of learning ($r=+0.629$, $p<0.01$) and satisfaction ($r=+0.616$, $p<0.01$) were positively correlated with perceived ease of use. Finally, satisfaction ($r=+0.484$, $p<0.01$) was correlated with perceived ease of learning.

Table 3. Pearson correlations coefficients among “USE” factors.

<i>Factor</i>	<i>Ease of Use (EU)</i>	<i>Ease of Learning (EL)</i>	<i>Satisfaction (S)</i>
Usefulness (U)	.382**	.311*	.588**
Ease of Use (EU)		.629**	.616**
Ease of Learning (EL)			.484**

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

4.3.4 Statistical hypothesis testing

Table 4 show the results of the regression analysis of the six hypotheses. Hypotheses H3 and H4 were not supported. The Adjusted R² values show that perceived ease of use and perceived usefulness together explained 50.3% of the variance in perceived satisfaction (F=23.263, p=0.000), while perceived ease of use explained 38.2% of the variance in ease of learning (F=28.175, p=0.000). Perceived ease of use was the most important predictor in satisfaction (beta=0.458, p=0.000). Finally, perceived usefulness accounted for 12.6% of the variance in ease of use (F=7.341, p=0.010).

5 CONCLUSIONS

The aim of this study was to use the questionnaire “USE” in order to investigate the factors that influence teachers’ satisfaction with using e-class.

Using an existing questionnaire, and in particular the USE questionnaire, after it adopted and modified to suit with the electronic classroom service (e-class) provided by GSN, we measured Usefulness, Ease of Use, Ease of Learning and Satisfaction of both the service itself and the learning of this service through e-learning course created for this purpose. The data collection for the evaluation of the these four factors was carried out using an electronic questionnaire.

Table 4. Regression analysis of the “USE” model factors.

<i>Dependent variable</i>	<i>Adjusted R²</i>	<i>Independent variable</i>	<i>Beta</i>	<i>t</i>	<i>Sig.</i>
Satisfaction (S)	0.503	Ease of Use (EU)	0.458	3.983	0.000
		Usefulness (U)	0.414	3.596	0.001
Ease of Learning (EL)	0.382	Ease of Use (EU)	0.629	5.308	0.000
Ease of Use (EU)	0.126	Usefulness (U)	0.382	2.709	0.010

The majority of teacher respondents felt that this electronic classroom service (e-class) provided by GSN is characterized by ease of use, ease of learning and usefulness, offering satisfaction.

However, a small percentage of the respondents did not recognize that the platform does not have the above characteristics. This phenomenon may be due either to lack of proper familiarization of teachers with the Information Technology, or lack of ease of use and usefulness of this platform. So, there should be further investigation of the underlying causes of the observed phenomenon and, in particular, of those suspending factors that contribute to the existence of this phenomenon.

It is worth noticing that although these four factors are interrelated, this is not the case with the demographic characteristics of the sample.

Future research can be the extension the success factors of e-learning systems through (a) Confirmation, (b) Information System Continuance Intention according to the Expectation-Confirmation model of IS Continuance (Expectation-Confirmation model of IS Continuance) by Bhattacharjee ([16]).

Also, research into the long-term impact of the training program would be interesting. This paper does not investigate whether teachers have applied the knowledge, skills and competences they have gained from the successful follow-up of the proposed training program. Therefore, it would be advisable to investigate the proportion of teachers who would create an e-course than they had in the past as well

as the qualitative development of e-course of teachers who knew the e-class service and had created e-courses without use the full potential of the service.

REFERENCES

- [1] K. Kabassi, I. Dragonas, A. Ntouzevits, T. Pomonis, G. Papastathopoulos, and Y. Vozaitis, "Evaluating e-learning management system for blended learning in Greek higher education", *Springer Open Journal*, 5(101), 2016. Retrieved from <https://doi.org/10.1186/s40064-016-1705-8>.
- [2] S. Valsamidis, S. Kontogiannis, I. Kazanidis, and A. Karakos, "eLearning Platform Usage Analysis", *Interdisciplinary Journal of ELearning and Learning Objects*, 7(1), 185-204, 2011.
- [3] J. W. Cone, and D. G. Robinson, "The power of e-performance", *Training & Development*, 55(6), 32-41, 2001.
- [4] O. R. Normark, and D. Cetindamar, "E-learning in a competitive firm setting", *Innovations in Education & Teaching International*, 42(4), 325-335, 2005.
- [5] I. Kazanidis, S. Valsamidis, and T. Theodosiou, "Proposed framework for data mining in e-learning: The case of Open e-Class", *Proceedings of Applied Computing 09*, Rome, Italy, 2009.
- [6] C. Romero, and S. Ventura, "Educational data mining: A survey from 1995 to 2005", *Elsevier journal of Expert Systems with Applications*, 2007.
- [7] G. Roberts, "Teaching using the web: Conceptions and approaches from a phenomenographic perspective", *Instructional Science*, 31(1-2): 127-50, 2003.
- [8] G. Torkzadeh, and T. P. van Dyke, "Development and validation of an Internet self-efficacy scale", *Behaviour & Information Technology*, 20(4), 275-280, 2001. doi:10.1080/01449290110050293
- [9] K. Orfanou, N. Tselios, and C. Katsanos, "Perceived usability evaluation of learning management systems: empirical evaluation of the system usability scale", *The International Review of Research in Open and Distributed Learning*, 16, 2015.
- [10] Greek School Network, Accessed 1 May, 2019. Retrieved from <http://www.sch.gr/>
- [11] OPENeCLASS, Accessed 1 May, 2019. Retrieved from <http://www.openeclass.org/>
- [12] Claroline, Accessed 1 May, 2019. Retrieved from <http://www.claroline.net>
- [13] F. A. Marco, V. M. R. Penichet, and J. A. Gallud, "Collaborative e-Learning through Drag & Share in synchronous shared workspaces", *J. UCS*, 19(7), 894-911, 2013.
- [14] Lund, A. M. (2001). Measuring usability with the USE questionnaire. Usability interface, *Usability Interface*, 8(2), 3-6. Ανακτήθηκε στις 18 Αυγούστου 2018, από https://www.researchgate.net/publication/230786746_Measuring_Usability_with_the_USE_Questionnaire
- [15] J. Nunnally, and I. Bernstein, (1994). *Psychometric theory* (3rd ed.). McGraw-Hill Humanities/Social Sciences/Languages, 1994.
- [16] A. Bhattacharjee, (2001). "Understanding Information Systems Continuance: An Expectation-Confirmation Model," *MIS Quarterly*, 25 (3), 351-370, 2001.