Moodle as a Teaching Tools in Mathematics-Case Study in University “Goce Delcev” Stip

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Abstract: During recent years, the teaching process at the University "Goce Delcev" Stip has been changing by usage of the e-learning methods. This paper compares the achievements of students in Math 1who use Moodle as a teaching tool with those who does not. Achievements of students are treated in the statistical program SPSS 17. We can conclude how e-learning impacts on the success of the students based on the results obtained.

Keywords: level of achievements, data analysis, teaching methods, Moodle

Introduction

During recent years, e-learning platforms are becoming increasingly sophisticated by showing potential as an effective way of improving the learning process. Numerous e-learning platforms exist; some require paying for access to enter the software, while others do not. The following are in the first category: WebCT, Blackboard, and TopClasse; Moodle, Ilias, and Claroline are free.[3,8] They are considered open-source software.
In the first years of the establishment and functioning of the University "Goce Delcev", the Republic of Macedonia, the teaching process in math courses was mostly realized by classical verbal text methods:

- Curriculum was presented to the students with a well-known and proven method (blackboard-chalk);
- Students recorded observations on the same classes, and they later served as a guide in the learning process;
- At the beginning of the course, the students received a list of literature needed, that partly could be found in the bookstore and library, but the most of it should have be found by themselves, because at that time the main source of learning for the students were the notes taken at the consultation classes with the teachers and the assistants.

With the development of the University and the efforts of all employees to make it modern higher educational institution in which teaching process will follow modern methods, an imminent need for change was to implement e-learning as a modern platform that functions in several Universities in Europe and the world. The university had a desire to make a connection between the art of the lectures and the exercises with the power and strength of the new IT technology, involving the generation and transfer of knowledge through the use of information and communication technology (ICT in teaching). E-learning as a method combines modern methods of learning with the management of knowledge and offers better ways to evaluate it.[7] We got a virtual learning tool which supports the usual learning. The teachers at the Department of Mathematics and Statistics adapted this way of working relatively quickly as a way of acquiring modern education which includes motivation, communication, efficiency and technology.

Context of the research problem (technology supported learning, advantages and disadvantages)

New technologies (the Internet, in particular) provide faculty with the tools for teaching–learning including the web-based applications known as e-learning Platforms. E-learning platforms have transformed the ways professors teach and students learn.[6] This transition has made it possible for students to take part in the learning process, while the role of the teacher

is that of “conductor”, orchestrating and guiding students their education.[4] Within this framework, University professors have had to modify the subjects and methodology involved in teaching/learning. Students must actively collaborate in learning, participating and collaborating with their teachers.

In the process of realization of math courses, we approach to the application of e-learning method developed in the following way:

- we created electronic courses, which are attached lectures and exercises as basic learning materials, supplementary materials, scripts, a collection of exercises, electronic books, and anything else that can help the student in the learning process. The courses make it possible to attach papers and homework. All information related to the subject is in the form of news, announcements, events, and results, the students get appropriate courses. The knowledge check can be done by organizing short tests and quizzes. On the courses there is a calendar with planned activities given;
- speed of communication between teachers, collaborators and students increased through the use of tools for collaboration and communication, setting up discussion forums etc..;
- the courses provide checking and evaluation of some students skills.[1,2]

In the process of transformation of teaching, we observed the following benefits:

- the materials, as well as electronic books, were available to students at any time and free of charge. Before this, students were not always able to obtain the recommended titles given by teachers and assistants;
- the students are not forced to "take" notes at lectures and exercises and can become active participants in the teaching process;
- in the learning process communication with other participants is possible without having physically meet them which saved time and money.

In this process, we met some difficulties in the following nature:

- e-learning user requires specific knowledge and skills in using the computer. Without basic computer literacy, e-learning would be hindered. It is necessary to possess adequate computer equipment, because the slightest technical problem will affect the student's concentration;
- E-learning requires students’ greater responsibility. They themselves have to estimate, how much time they need for learning certain contents, to motivate themselves, which can lead to poor progress in the learning process.

The interest of the participants in the process of conversion of math is the measurement of student achievement in math final exams and it is compared to those achievements by way of teaching process.

Research Methodology

Mathematics 1 of Computer Science at the University “Goce Delcev”, the Republic of Macedonia is taught in the first semester. In academic years 2010/2011 and 2011/2012 part of the teaching process makes use of the electronic course in Math 1.
We analyzed the level of achievement of students in the February exam for 2009/2010, when the teaching process was realized with classical verbal text method and for 2010/2011, 2011/2012, when the teaching process was supported by e-learning.[8]
The data processing is done in the statistical package SPSS17.[5]

Analysis of research results

Table 1 shows the success of students achieved in the academic year 2009/2010.

Table 1: The achievements of students in February exam for generation of 2009/2010

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
passed	54	45,8	45,8	45,8
failed	64	54,2	54,2	100,0
total	118	100.0	100.0	

The course of math 1 in the winter semester of 2009/2010 year was attended by 118 students. From Table 1, it can be seen that 45.8% of students passed the exam in February, while 54.2% have not passed. A more detailed analysis of the achievement of students who passed the exam is given in Table 2:

Table 2: Results of students who passed in February examination period for generation 2009/2010

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	6	32	50.0	50.0	50.0
	7	15	23.4	23.4	73.4
	8	9	14.1	14.1	87.5
	9	5	7.8	7.8	95.3
	10	3	4.7	4.7	100.0
	Total	64	100.0	100.0	

From the given results it can be seen that more than 50% of the students who passed the exam passed it with grade 6. Only 4.7% of the passed

students received grade 10. The average success achieved in academic year 2009/2010 in math 1 for February exam is 6.94.

Table 3: Measures of central tendency for the achievement of students for February exam for generation 2009/2010

N	Valid	64
	Missing	0
Mean		6,94
Median		6,50
Mode		6
Std. Deviation		1,180
Variance		1,393

For the academic year 2010/2011 for February exam, the data are shown in Table 4.

Table 4: The achievements of the students for February exam for generation 2010/2011

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
passed	72	56,7	56,7	56,7
failed	55	43,3	43,3	100,0
total	127	100.0	100.0	

The results show that of the 127 students who claimed exam in math 1, 56.7% of students passed the exam. More of students passed the exam this year than the previous one.
The success of passed students is given in the following table:

Table 5: The achieved of students, who passed for February exam for generation 2010/2011

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	6	38	69.1	69.1	69.1
	7	7	12.7	12.7	81.8
	8	6	10.9	10.9	92.7
	9	2	3.6	3.6	96.4
	10	2	3.6	3.6	100.0
	Total	55	100.0	100.0	

80% of students passed the exam with a grade 6 or 7, while only 3.6% passed with grade 10. Passed students' average performance is 6.60, which is very close to the average success last year.

Table 6: Measures of central tendency for the achievement of students in February examination period for generation 2009/2010

N	Valid	55
	Missing	
Mean		6,60
Median		6,00
Mode		6
Std. Deviation		1,065
Variance		1,133

In the academic year 2011/2012 students in math 1 achieved the following results:

Table 7: The achievements of the students for February exam for generation 2011/2012

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
passed	67	51,5	51,5	51,5
failed	63	48,5	48,5	100,0
total	130	100,0	100,0	

Table 8: Achieved success of students who passed for February exam for generation 2011/2012

		Frequency	Percentage	Valid Percentage	Cumulative Percentage
Valid	6	24	35.8	35.8	35.8
	7	18	26.9	26.9	62.7
	8	15	22.4	22.4	85.1
	9	7	10.4	10.4	95.5
	10	3	4.5	4.5	100.0
	Total	67	100.0	100.0	

51.5% of students passed the math 1 in February exam session. 15% of passed students won grades 9 and 10. The number of students who received a minimum grade for passing the exam reduced. Average performance achieved was 7.21 In Table 9, we have the best average grade.

Table 9: Measures of central tendency for the achievement of students for February exam for generation 2011/2012

N	Valid	67
	Missing	0
Mean		7,21
Median		7,00
Mode		6
Std. Deviation		1,175
Variance		1,380

The success we are achieving with students in the three years of study in the February examination period is changed. From the analyzes it can be seen that in the academic year 2010/2011 the success of students reduces, a large percentage (69.1%) of students received a grade 6. Next year this percentage drops to 35.8%, but at the expense of increasing the number of students who received 7 or 8. The last academic year 2011/2012 achieved the best results in terms of the number of passed students, and obtained higher average performance grade.

From the analyses previously made, we can conclude that the percentage of passed students is increasing, and the average success of the students who passed the exam increases. It is shown in the following charts:

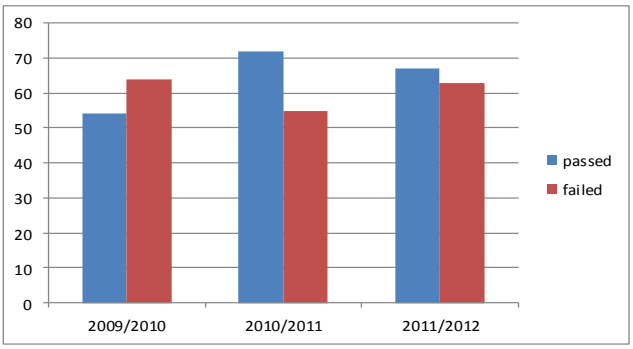

Figure 1: The results of generations of students for February exam

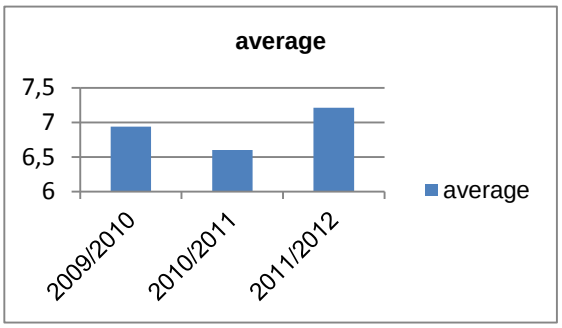

Figure 2: Average success of generations of students who passed for February exam

Figures 1 and 2 show that the academic year 2010/2011 is the year that reduces the number of passed students who passed the year with students' average performance. It is the period when the more intensive use of e-learning is applied in the learning process. In this period, teachers and students needed the time and training to use e-learning tools. But later the results were already visible. The achievement of students in math 1 has increased. In order to determine whether the dependence of the students' success achieved in three academic years 2009/2010, 2010/2011 and 2011/2012 and the way of implementation of the curriculum is connected we use the hypothesis:

H_0: There is a statistically significant difference between the success that students achieve, and the way of implementing the curriculum, opposed to the alternative hypothesis:

H_1: There is no statistically significant difference between the students' success and the way of learning curricula.

However, Pearson χ^2 test is used.

Evaluation of student achievement in two consecutive academic years:

Table 10: Test χ^2 for teaching 2009/2010-2010/2011

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	86.210[a]	1	.000
Continuity correction	82.714	1	.000
N of Valid Cases	118		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 20.59.

b. Computed only for a 2x2 table

Table 11: Test χ^2 for teaching 2010/2011-2011/2012

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	62.414[a]	1	.000
Continuity correction	59.512	1	.000
N of Valid Cases	127		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 20.59.

b. Computed only for a 2x2 table

Table 12: Test χ^2 for teaching 2009/2010-2011/2012

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	75.786[a]	1	.000
Continuity correction	72.574	1	.000
N of Valid Cases	118		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 20.59.

b. Computed only for a 2x2 table

In all three tests the hypothesis Pearson test value is obtained Asymp. Sig = 0.000. This means that there is a statistically significant difference between the success students achieve and the way they realize the curricula.

Conclusion The results of students achieved in math 1 may not be the best but they show a tendency for improvement. Our findings are confirmed, the application of e-learning as a method of realization of math leads to improved student achievement. Teaching becomes dynamic, and therefore more interesting for monitoring by students. Students can increase their learning skills using IT. Those using the Moodle platform regularly throughout the school year seem to get better grades than those who rarely or never use it. However, to implement e-learning environments, students' acceptance of this technology is a very important issue.

In summary, this research contributes to the field of e-learning platforms acceptance because it provides insight on factors that contribute to intention to adopt this technology. The findings point out specific actions by faculty that can improve student experience with Moodle and identify other actions that appear to have no effect. These results could be used to direct Universities toward successful paths for supporting communication between teachers and students using Moodle. Further research might investigate the importance of influences such as individual differences, prior experience, level of educations, different countries and the role of technology in Universities in the context of predictors of perceived ease of use and usefulness. More broadly, future research should seek to further extend models of technology acceptance to encompass other important theoretical construct in education.

References

[1] A. Bergeren, D. Burgos, J.M. Fontana, D. Hinkelman, V. Hung, A. Hursh(2005) *Practical and pedagogical issues for teacher adoption of IMS learning design standards in Moodle*. LMS Journal of Interactive Media in Education

[2] A. Ciudad *Teaching innovation and use of the ICT in the teaching-learning process within the new framework of the EHEA, by jeans of Moodle platform* American Journal of Business Education, 3 (13) (2010), pp. 13–19

[3] C. Romero, S. Ventura, E. García(2008)*Data mining in course management systems: Moodle case study and tutorial* .Computers & Education, 51, pp. 368–384

[4] G. Fillion, M. Limayem, T. Laferrière, R. Mantha(2007) *Integrating ICT into higher education: a study of onsite vs online students' perceptions.* Academy of Educational Leadership Journal, 11 (2), pp. 45–72

[5] S.Pacemska, S.Jakimovic, T.A.Pacemska (2011)„ Efekti od koristenje na programskiot paket GeoGebra vo temata „Funkcija.Proporcionalnost " vo VII oddelenie od osumgodisnoto osnovno obrazovanie, VI Megunaroden Balkanski kongres za obrazovanie i nauka "Sovremeno opstesvo i ", 30.09-1.10. 2011, Ohrid

[6]T.Escobar-Rodriguez,P.Monge-Lozano(2012)*The acceptance of Moodle technology by business administration students.* Computer&Education, Vol58,Issue4,pp.1085-1093T.

[7] T. Teo, J. Noyes (2011*) An assessment of the influence of perceived enjoyment and attitude on the intention to use technology among pre-service teachers: a structural equation modelling approach.* Computer & Education, 57, pp. 1645–1653

[8] T. Martin, A. Serrano(2009) *The role of new technologies in the learning process: Moodle as a teaching tool in Physics.* Computer & Education, 52, pp. 35–44