Comparison of Traditional and WEB-Based Education - Case Study "BigBlueButton"

Gabor Kiss
Department of Mechatronics and Cartechnics Engineering
Óbuda University
Bécsi ut 96/b, Budapest, Hungary, H-1034
kiss.gabor@bgk.uni-obuda.hu

Abstract —**The goal of this research was an analysis of the paper results in two groups of students in second semester to see the result of an earlier research was correct or not. In the first group I made the presentation of the lectures virtual by using the BigBlueButton web conference system (n=118) while the lectures for the second group were delivered in class (traditional way, n=171). The experience shows, the majority of the students do not visit the presentations at the universities, just download the learning material and try to take a successful exam, but they do not have too much chance to pass it. First of all I wanted to see how many students take part in the virtual and traditional presentations respectively in the next semester and I observed that the virtual way was preferred (~80% of students) to the classical way (~30-40%), I got same result like in the first semester. The students in the first group were more motivated; they took this opportunity rather than the conventional educational method. My starting hypothesis was that the group where I used the web conference system as a presentation tool would achieve better results in the papers. It was based on the differentiation of the number of participants at the presentations, because more students visited the virtual presentations and followed the lessons over the Internet. After the evaluation of the final tests results the correctness of the original presumption seemed to be proved. Significance level was 5% through the analysis. It was found significant divergence in the knowledge of the students taking part in the virtual presentations and that of the students using the traditional way. The students could get one mark better paper results when they followed the virtual lesson. I made this research with partly other students and I get same result. Consequently, the use of the web conference system as a presentation tool is productive; the students follow the presentations with more motivation to use this new tool in their studies and get better results when writing papers.**

Keywords: comparison, web-based education, case study, virtual classroom, virtual lesson, traditional education, measuring

I. INTRODUCTION

Students of the undergraduate course Introduction to Informatics get acquainted with operating system, computer network and data encryption in history as well as with up to date applications in the second semester. I used different didactical methods to make students get better paper results [1][2][3]. My colleagues use a same way in other subjects too [4]. The experience shows the majority of the students do not visit the traditional classroom presentations at the universities, just download the learning material before the test and try to take a successful exam, but they do not have too much chance to pass it [5][6]. It is often said that young people continuously sit at the computer surfing the Internet or visiting the Facebook or other websites [7][8]. I have already started to use a web conference system during my consultation hours; the students have the opportunity to ask the problematic questions to understand the learning material that they can download after the presentations. I think the web-based consultation is a good way to catch the students who have problems with the learning material but do not have enough courage to ask questions [9][10].

I wanted to try this tool during the lessons too in the first semester with freshmen students and an excellent opportunity presented itself when a great number of students were admitted. After the evaluation of the test result of these students, I have found in the first semester the mechanical engineer students could take advantage of this tool before the first and second test. The students could get a half mark better paper results when they took part in the web-based presentations and the number of the students who could pass the test ~doubled [11].

Some colleagues use the new techniques to teach the new generation of students as me [12] and it was found, the students preferred the virtual way of study [13] and I got same results in the first semester by freshmen students too.

The mechanical engineering students attended my lectures held at different times in two groups in second semester too, in this case I could make a control analysis with partly new students on the final tests result. The students who used web-based lessons from week to week to follow the presentation were in the first group (group A) while the students who did not take part in any online presentation were in the second group (group B). The build of groups based on random, because the students' office separated the students in these two groups before. In the first and second group were students who visited the web-based lessons in the first semester and lot of students have to repeat this semester and have never used before (Table I.).

978-1-4673-2108-2/12/$31.00 ©2012 IEEE

TABLE I. GROUP STATISTICS OF FINAL TESTS RESULTS

Group	Number of freshmen students	Number of students from first semester	Number of students who visited the virtual lessons in the first semester
A	53	65	34
B	121	50	27

Students in the first group could follow the presentations from home and they could ask questions online in a chat window. I think it might have had more visitors than the traditional classes. This way the students take part in the lessons more actively, ask the problematic questions and are more likely to get better final tests results. This is my starting hypothesis.

II. BIGBLUEBUTTON THE OPEN SOURCE WEB CONFERENCING SYSTEM

Earlier I used the BigBlueButton open source web conferencing system in Computer Science Education as a consultation tool and I have used it as a presentation tool in this year. In this system the teacher can upload any PDF presentation or office document and keep everyone in synch with their current page, zoom, pan, and the students can also see the teacher's mouse pointer. The users can share their webcam at the same time without limit on the number of simultaneously active webcams. The teacher can broadcast their desktop for all students to see (figure 1.). The system supports voice over IP (VOIP) conferencing. All students need speakers and a microphone to participate [14].

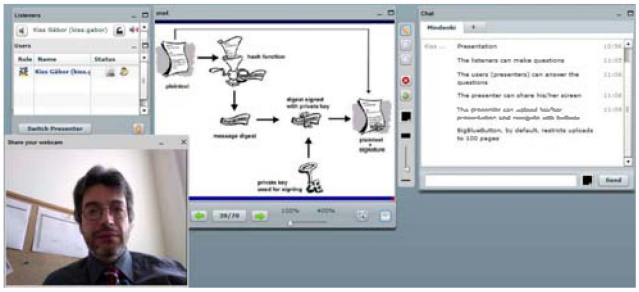

Figure 1. Desktop of BigBlueButton

My experience shows the students are more motivated to use a web conferencing tool as a consultation tool and I think they would also like to use it as a virtual lesson tool.

ANALYSING OF THE PAPER RESULTS

A. *The Number of Participantst in the Second Semester in the Two Groups and the Values of Mean and Std. Deviation*

The students have to write a final tests' at the end of the second semester to show how well they have learned the learning material. I analysed the results of the students during the second semester and made two groups. In the first group of lectures I made the presentations virtual by using the web conference system (group A) while the lectures for the second group were delivered in the classroom (traditional way, group B).

TABLE II. GROUP STATISTICS OF THE FINAL TESTS RESULTS

Group	**Number of participants**	**Mean**	**Std. Deviation**	**Pass the test**
A	118	2,22	0,926	71%
B	171	1,34	0,522	31%

According to the table (Table II.) the mean of the results of the final tests of group A is higher. It means this group wrote the papers with a better result. It does not give enough information to state that the use of web-based education results in better written tests because this can happen accidentally, too. So, we needed more analyzing to keep the chance of accident low.

If we spend more time looking at this table, we can see ~71% of the mechanical engineers who took part in the web-based education could pass the test and the students who used the traditional way of education passed the test in lower percent, but we still do not know if it is a coincidence.

B. *Independent Samples test of Final Tests by Students*

Since we have two independent samples, we can use the T-test to tell if the means of the final tests of these groups differ or not (Table III).

TABLE III. INDEPENDENT SAMPLE TEST OF FINAL TESTS RESULTS

	Levene's test for Equality of variances		T-test for equality of means		
	F	Sig.	t	df	Sig. (2-tailed
Equal variances assumed	**99,31**	**0,00**	-10,30	287	0,00
Equal variances not assumed (Welch's t-test)			**-9,36**	168,40	**0,00**

An analysis of the results of the mechanical engineers showed, the variance of two groups are different, because the value of Levene's test is significant ($p<0,05$) [15].

In this case the means could be compared with Welch's d-test, which showed up a difference between the means [16], because the value of Welch's d-test is significant ($p<0,05$). It means the use of the web-based presentation had influence on the results of final tests of the mechanical engineers.

C. *Measures of Association by the Final Tests Results*

Earlier, significant differences could be detected between the means of the final tests written by the mechanical engineers. It means it is profitable to make a deeper analysis to reveal the influence of the web-based consultation on the calculated means. I could reveal the influence with the calculation of the Eta-squared (η2) [17]. The calculated value in percentage shows how much grouping influences the difference between means. Square root from the Eta-squared gives a value between 0 and 1 (η). This shows the measures of association, i.e. how strong the connection between grouping and the achieved result is. The higher the value is, the stronger the connection is. In the next table we can see the calculated values and the strength of the connection (Table IV.).

TABLE IV. HOW STRONG THE CONNECTION BETWEEN GROUPING AND THE ACHIVED FINAL TESTS RESULTS

η^2	η	Strength of the association
27 %	0,52	middling connection

Calculating the Eta-squared I tried to make the effect of the web-based education on the result of the final tests written percentable and got 27 %. This means there is a middle strong correlation existing between using the BigBlueButton web conference system and the results of the final tests written by the students. It seems the students could take advantage of using a web-based education before the final test. We can remember the students who took part in the web-based presentations could pass the test in higher percent (71% vs 31%).

III. CONCLUSION

After the analysing process we can say my starting hypothesis is correct; students get better paper results by using a web consultation system as a virtual presentation tool. The mechanical engineer students could take advantage of this tool before the final test. The students could get a one mark better paper results when they took part in the web-based presentations and the number of the students who could pass the test ~ doubled. The reason for this could be the fact that the virtual presentation was preferred (~80% of students participated regularly) to the traditional education (~30-40% of students appeared regularly). It means the students who saw the presentations on the screen of their computer and listened to them via loudspeakers or took part in the traditional presentations in class from week to week learned the given part of the learning material and passed the test in higher percentage. The students who did not visit or listened to the presentations because they were not motivated enough passed the test in lower percent. Today the traditional way is not preferred at the universities in Hungary [3]. Several lecturers have the same experience; the students do not visit the traditional presentations and, as a consequence, they can pass the exams in lower percent than earlier [5]. In this research we could observe that the students are more motivated to take part in a virtual lesson because it is a new way of presentation; they can stay at home during the time of the lesson. They tend to visit it regularly and so they get better paper marks. I have got same result in the first semester with partly other students [11] and control analysis in the second semester just make stronger my idea: we can catch this "Net Generation" via the Internet to share our knowledge with them. The students are more motivated in Japan too to visit virtual lessons [13], so the teachers may try this way in other countries too to see the difference between the results. Virtual lessons are not usable in some topics, were the teacher have to be in same classroom with the students (programming labs, and so on).

IV. FUTURE WORK

Earlier we could see the use of this tool shows difference among the students and I could make a control analysis with other students too and I got same results. I will make my presentations exclusively on a web-based system in the next semesters and I will compare the paper results and learning habits of the students with the results of those who learned the same learning material in a traditional way some time ago.

V. REFERENCE

[1] Gabor Kiss, "Wie kann man die Steganographie und Kryptographie bekannt machen?", *Informatik und Schule, Infos 2005*, Dresden, 2005, Technische Berichte, pp: 31-35, ISSN: 1430-211x

[2] Gabor Kiss, "Analysing the relationship between students' paper results and flash based logical problem solving in the course Introduction to Informatics", *Óbuda University e-Bulletin*, Volume 1, Issue No. 1, pp:133-139, ISSN 2062-2872, 2010

[3] Gabor Kiss, "Experiences in teaching data concealment and data encryption to engineering undergraduates", *9th IEEE International Conference on Information Technology Based Higher Education and Training* (ITHET 2010), Cappadokia, ISBN 978-1-4244-4811-1, pp:419-423, IEEE Catalog Number: CFP10587-CDR, IEEE Xplore digital library Digital Object Identifier: 10.1109/ITHET.2010.5480011

[4] Krisztina Erdélyi: "Practice based course of Information Technology Service Management for BSc students" In: *Teaching Mathematics and Computer Science 8/2* (2010) pp. 229-246

[5] Gabor Kiss, "THE ANALYSING OF THE COMPUTER SCIENCE LEARNING HABITS IN THE FIRST YEAR ON THE BUDAPEST TECH", *4th Aspects and Visions of Applied Economics and Informatics*, 2009, pp: 556-560, ISBN 978-963-9732-83-4

[6] Gabor Kiss, "Analyse der Studienleistungen von Studierenden an der Universität Óbuda und deren Implikationen für die Infomatikausbildung", *Commentarii informaticae didacticae* (CID) Volume 4, pp:71-77, 2010, Paderborn, ISSN (print) 1868-0844, ISSN (online) 2191-1940

[7] Victory, N., Cooper, K., "How Americans are expanding their use of the Internet", *A nation online*, 2002

[8] Oblinger, D., Oblinger J., "*Educating the Net Generation*", ISBN-13: 978-0967285320, 2005

[9] Gabor Kiss, "Using web conference system during the consultation hours", *7th IEEE International Symposium on Applied Computational Intelligence and Informatics*, 2012, Timisoara, Romania, 2012,

[10] http://en.wikipedia.org/wiki/Comparison_of_web_conferencing_software (Retrieved 2012.03.04)

[11] Gabor Kiss, "Using web conference system during the lessons in the Higher Education", *11th IEEE International Conference on Information Technology Based Higher Education and Training (ITHET 2012)*, Istanbul, 2012, ISBN: 978-1-4673-2334-5, p. 4

[12] Arif Selçuk Ögrenci, "Empirical Results about Efforts for Effective Teaching to y-Generation Freshman Students",*11th IEEE International Conference on Information Technology Based Higher Education and Training (ITHET 2012)*, Istanbul, 2012, ISBN: 978-1-4673-2334-5, p. 5

[13] Hidenori Akiyama, Tsuyoshi Kiyan, Seiichi Kamaga, Mariko Akiyama, "Evaluation of Lecture Using Web-based e-learning and Development of Rapid e-learning System",*11th IEEE International Conference on Information Technology Based Higher Education and Training (ITHET 2012)*, Istanbul, 2012, ISBN: 978-1-4673-2334-5, p. 5

[14] http://www.bigbluebutton.org/ (Retrieved 2012.03.04)

[15] Levene, H., "Robust tests for equality of variances", In Ingram Olkin, Harold Hotelling, et alia. *Stanford University Press*, pp: 278–292., 1960

[16] http://en.wikipedia.org/wiki/Student's_t-test (Retrieved 2012.03.04)

[17] Cohen, J., "Eta-squared and partial eta-squared in fixed factor ANOVA designs" : *Educational and Psychological Measurement*, 33, pp: 107-112, 1973