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The comparison of impact offline and online presentation on student achievements: A case study

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Abstract - **Nowadays online presentations and educational videos are frequently integrated into various-learning environments and applications, such as MOOCs, global sets of conferences or video-sharing websites. This paper presents the findings of a comparison of online presentations (educational videos) and offline presentations. The total number of student participants in this research was 191, mostly primary and secondary school students from Serbia as well as Hungary, studying both online and offline learning environments within the framework of the course Conscious and safe internet usage. The impact of offline and online presentations was investigated using both pre- and post-presentation questionnaires. Statistical analysis was used to measure the impact of offline and online presentations, in addition to other factors determining student achievements.**

Key words: offline presentation, online presentation, student achievement

I. INTRODUCTION

Who has not heard of the cloud school project founded by Sugata Mitra, introducing a revolutionary school which eliminates the teacher in favour of a projector and Internet connection. Adhering to this spirit and following this line of logic, hundreds of video-based online learning platforms have been appearing on a daily basis. A few years ago Kőrösi (2015) highlighted that E-learning websites would bring a positive and lasting change to education [1]; however, a growing number of experts advocate video-based education and MOOC courses that would trigger a substantial reform [2][3][4][5]. This trend seems to be accelerating rather than slowing down [6], though a rapid change may carry a considerable number of unsolved questions. To meet these requirements, there is a need for conducting empirical studies, and completing case studies, since it has become obvious that traditional, distance, and video-based learning have their

advantages and disadvantages, respectively. The advantages of the first method include being a closed and restricted educational environment led and motivated by a teacher, while the latter two allow learning freed from time and place constraints [7].

The characteristics of the above-mentioned methods must be, however, taken under a close examination in order to reveal if one could produce similar values through keeping the same motivational factors and teacher control with the traditional and video-based learning environment (MOOC). To answer such questions, the authors examined online and off-line opportunities to be incorporated into education based on the same conditions. This paper presents the findings of the comparison of online (educational videos) and offline presentations. The total number of student participants in this research was 191, mostly primary and secondary school students from Serbia as well as Hungary, studying both online and offline learning environments within the framework of the course Conscious and safe internet usage. The impact of offline and online presentations was investigated using both pre- and post-presentation questionnaires. Statistical analysis was used to measure the impact of the offline and online presentations, as well as other factors determining student achievements.

The paper consist of the following sections: Traditional vs. online-video learning, Background, Interpretation of the research results and Conclusion.

The first section examines the comparison of online and offline video learning, the second section describes the theoretical background and the hypotheses, methods and the sample of this investigation. In the third section authors present the results of research and based on this results in the fourth section have been conceptualized the conclusion.

II. TRADITIONAL VS. ONLINE-VIDEO LEARNING

The basis of modern online education does not originate in websites or pdf files but they are constructed using videos. Taking a closer look at video-based teaching, one must realize that it has been around for a significant period of time going back as far as filmstrips studied during World War II as a training tool for soldiers [8]. Despite their 70-year long existence, there are still unresolved questions to be answered. The mystery behind this may be justified by the under-development of the technical background. In those times, the recording of a video series for lectures cost a fortune, while today mobile phones and video sharing platforms provide almost free tools to complete the same task. Despite technical possibilities, it is noticeable how many obstacles still lie in the way of such educational possibilities. Not surprisingly, the United States is a great step ahead in terms of developing online platforms for video-based education involving universities and public institutions. To list but a few, these are Udacity, edX, etc. Furthermore, with the constant spread of this learning system, it will be highly desirable to reveal the differences and overlaps between the traditional and virtual educational methods. This concept is reinforced by the fact that the number of online courses rises exponentially, day by day [6]. In line with the above-stated, [9] attempted to provide a list of the strengths and weaknesses of the traditional educational methods and the online (video based) teaching.

A. Online Education

Pros

1. saving
2. convenience and flexibility
3. more marketable skills and job focus
4. learning digital skills in a digital space
5. keeping up with the times

Cons

For a list of cons regarding online education, all one really needs to do is look at the pros list for traditional education. Online education will most likely not provide these benefits. It also offers limited career options. One will not be able to become a doctor, lawyer, etc. with online education nor will one be able to enjoy the typical college experience. Online education empowers people who are self-directed and motivated but it can be lonely compared to traditional education.

B. Traditional Education

Pros

1. experience
2. network
3. people will recognize the obtained degree
4. provides facilities necessary for certain studies and activities
5. some careers and professions generally require a degree

Cons

1. it is considerably expensive
2. it does not always save one from underemployment
3. it might not provide the skills needs

By observing Rauch's (2015) arguments, one cannot reveal new information regarding this field, since most of the researchers are already well informed [9]. Society cannot easily be convinced by enumerating rational arguments favouring new technological solutions because innovations have always been regarded with a certain suspicion. The success of video lessons cannot be neglected given the fact that studies have proven the efficiency of educational films created long before the Internet era. [10] by using examples also touch upon these facts:

- Watching the television program Blue's Clues has strong effects on developing preschool viewers' flexible thinking, problem solving, and prosocial behaviors.

- Court TV's Choices and Consequences program reduced middle school students' verbal aggression-including tendencies to tease, swear at, and argue with others.
- Viewing Sesame Street was positively associated with subsequent performance in reading, mathematics, vocabulary, and student readiness. A "recontact" study with a sample of 15- to 20-year-olds found that those who had been frequent viewers of Sesame Street at age 5 had significantly better grades in English, science, and mathematics; read more books for pleasure; and had a higher motivation to achieve.

A number of researchers argue supporting this line of thought. Video is a rich and powerful medium being used in E-learning. It can present information in an attractive and consistent manner. [11] The use of video is only beginning to meet the needs of today's and tomorrow's learners. Video can help educators address the challenge of different learning styles and enhance the way in which today's children and youth access, absorb, interpret, process and use information [12]. One of the greatest strengths of television and video is the ability to communicate with viewers on an emotional, as well as a cognitive, level. Because of this ability to reach viewers' emotions, video can have a strong positive effect on both motivation and affective learning. [13]. Although the impact of video and multimedia technologies in educational outcomes is a field of ongoing research, the pedagogical impact of video can be summarized by three key concepts:
1) Interactivity with content (the learner relates to visual content, whether verbally, by note taking or thinking, or by applying concepts)
2) Engagement (the learner connects to the visual content, becoming drawn in by video, whether on-demand or real time)
3) Knowledge transfer and memory (the learner may remember and retain concepts better than with other instructional media) because video combines many [12].
It is, however, not enough to highlight all the positive aspects because as [9] points out, one must consider the differences between the traditional and the new online educational methods, also observed by others. Ya Ni's (2013) opinion ought to be stated here, namely that: An important component of classroom learning are social and communicative interactions between a student and a teacher, and a student and a student [14]. Nyíri (2009) enumerated four important deficiencies: Firstly, due to the shift from a personal communication to virtual communication, cognitive losses may appear somewhere in the process [15]. Secondly, information carried over by paper-based or printed texts regarding cognitive qualities are different from textual information appearing on the screen. Thirdly, a study must clarify the question to what extent can information be carried by texts in a digital environment supplemented by information mediated by images. Lastly, one must check an obvious but hard-to-analyze phenomenon, specifically, to what extent different personality types differ in solving tasks in a virtual environment.
A MOOC course would touch upon these questions and deficiencies in an attempt to combine the possibilities of both the traditional and the video-based education. Finally, to verify all the listed assumptions, they must be put to practice in real life circumstances, whose efficiency must be further confirmed by empirical and case studies.

III. BACKGROUND

A. Hypotheses

(1) It was assumed that the achievements of both groups would increase during the test process, in accordance with an increase in the level of acquired knowledge.

(2) It was assumed that the experimental (online) group would achieve a higher average of points, over three tests, control (offline group).

(3) It was assumed that the average total score of experimental (online) group would be significantly higher than the average total score of the control (offline group).

(4) It was assumed that the time spent in an online environment is directly proportional to achievements in the case of both groups.

B. Methods

The online course was held in February and March 2015 and the offline course was organized in January 2016. The course was called "Conscious and safe internet usage" and it consists of the following modules:

- 1. module - Digital footprint
- 2. module - Conscious and safe internet usage
- 3. module - Online bullying

After each module, the students filled in some tests, for the experimental (online) group it was online tests, while the control (offline) group received paper-based offline tests. The tests were identical, all sheets contained 3 x 10 questions and the maximum score was 20.

C. Participants

A total of 191 students participated in this investigation . The participants were divided into two groups:

1.) 120 students in the experimental (online) group
2.) 71 students in the control/offline group (Table1.).

TABLE I. THE DISTRIBUTION OF PARTICIPANTS INTO TWO GROUPS

	N	%
experimental/online group	120	63
control/offline group	71	37
total	**191**	**100**

The average age of the participants was 19. The youngest participant was 11 and the oldest was 63 years old. The average age in the experimental/online group was 23,while in the control/offline group it was 13 (see Table2.).

TABLE II. THE AGE OF THE SAMPLE

	Mean	Minimum	Maximum	N
age of experimental/ online group	22.9	12	63	120
age of control/offline group	12.9	11	15	71
average of both groups	19.2	11	63	191

The countries of residence of the students were Hungary, Serbia and Romania with the following distribution: 19% of the participants were from Hungary, 80% from Serbia and there was one participant from Romania (see Table3.).

TABLE III. RESIDENCE OF THE SAMPLE (COUNTRY)

country	N	%
Hungary	37	19
Serbia	153	80
Romania	1	1
total	**191**	**100**

IV. INTERPRETATION OF THE RESEARCH RESULTS

The members of the experimental/online group reached an average of 15,15 points during the first test, 16,22 point during the second test and 18,73 during the third test. In the control/offline group the average points was 12,34 during the first, 12,37 during the second and 13,97 during the third test (see Table4.).

TABLE IV. RESULTS OF THREE TESTS

	experimental/online group (N=120)				control/offline group age (N=71)			
	Mean	**Std. Dev.**	**Min.**	**Max.**	**Mean**	**Std. Dev.**	**Min.**	**Max.**
first test	15.15	3.2	2	20	12,34	3,4	2	20
second test	16.22	2.9	8	20	12,37	3,4	2	18
third test	18.73	2.2	8	20	13,97	3,8	0	20
total	50.10	5.5	28	60	38,68	8,5	14	54

A significant increase was proven based on the paired samples t-test values between the experimental (online) group means of the first and second test values ($t = -2.8$, $p = 0.006$), the second and third ($t = -8.5$, $p = 0.001$), and the first and third ($t = -11.3$, $p = 0.001$) tests (see Table5.).

TABLE V. RESULTS OF PAIRED SAMPLES T-TEST IN THE EXPERIMENTAL / ONLINE GROUP

	t	df	Sig. (2-tailed)
first test - second test	-2.817	119	0.006
second test - third test	-8.582	119	0.001
first test - third test	-11.287	119	0.001

Examining the same values, using paired samples t-test, in the control (offline) group there were no significant differences between the results of the first and second tests ($t = -0.64$, $p = 0.94$). On the other hand, there was a statistically sustained increase in the student achievements between the second and third ($t=-3.69$ $p=0.001$) and the first and third test ($t=-4.02$ $p=0.001$) (see Table6.).

TABLE VI. RESULTS OF PAIRED SAMPLES T-TEST IN THE CONTROL/OFFLINE GROUP

	t	df	Sig. (2-tailed)
first test - second test	-0.64	70	0.94
second test - third test	-3.69	70	0.001
first test - third test	-4.02	70	0.001

Comparing the performance of the experimental and control groups in the first ($t = 5.7$, $p = 0.001$) and second ($t = 8.3$, $p = 0.001$) and third ($t = 9.7$, $p = 0.001$) tests and the total score ($t=10.1$ $p=0.001$), there were significant differences. The experimental (online) group in each case achieved better results than the control (offline) group (see Table 7).

TABLE VII. RESULTS OF TWO-SAMPLE T-TEST

	F	Sig.	t	df	Sig. (2-tailed)
first test	0.580	0.447	5.754	189	0.001
second test	1.575	0.211	8.276	189	0.001
third test	23.885	0.001	9.717	98.243	0.001
total	15.963	0.001	10.076	105.488	0.001

The time spent online for all groups was 2.3 hour. In the experimental (online) group this value was 2.4 and in the control (offline) group it was 2.2 hour. Most of the members of the experimental and control group spent 1-3 hours in an online environment (see Table 8).

TABLE VIII. TIME SPENT ONLINE

	experimental/online group (N=120)		control/offline group age (N=71)
time	**N**	**%**	**N**
less than 1 hour	15	12,5	9
1-3 hour	63	52,5	46
4-5 hour	26	21,7	11
more than 5 hour	16	13,3	5
average (hour)	2,36		2,17

Authors could not prove a statistically significant relation between the time spent online and student achievements.

V. CONCLUSION

Based on the results, the first hypothesis that assumed both groups' average performance would increase during the three measurements was proven, the average performance increase in the case of the experimental (online) group was greater than that of the control (offline) group had.

The assumption of the second hypothesis regarding the experimental group was proven; the group working in an online environment achieved significantly better results in all three measurements compared to the previous measurement. Regarding the control group there was no performance increase between the first and the second measurements although the third measurement showed significantly higher points than the first and second ones. This means that the program is also useful in an offline environment, however, the performance increase takes more time.

Both the experimental and the control groups' accumulated results based on the three measurements showed significant difference in favor of the experimental group. Thus according to the third hypothesis, at the end of the program the experimental group achieved better results than the control group.

The fourth hypothesis that assumed that time spent in an online environment is directly proportional to the performance could not be proven for either group.

This analysis showed that learning free from time and place using online video-based learning is more effective than offline learning method, therefore it is not surprising that more and more universities provide space for online training courses. Although the results show positive changes, many people, including the majority of the ministries of education, harbor doubts about the effectiveness and efficiency of this method, nonetheless numerous applications demonstrate that there is a need of this kind of education.

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