EVALUATION OF AN ASYNCHRONOUS AND A SYNCHRONOUS TEACHING PROCESS BASED ON WORLD WIDE WEB AND VIDEOCONFERENCING FOR HIGH SCHOOL STUDENTS

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Abstract

This paper presents the experience that was acquired from the organization, the preparation and attendance in courses that involved both synchronous and asynchronous methods of education. Greece is a country with many small islands and too many villages in mountains in mainland. This particularity restricts access to these areas. The above courses tried to find a cost effective solution to this problem using ICT and especially video – conferencing. The paper also presents an evaluation of these courses including comments of the participating teachers and a statistical analysis of a questionnaire that was given to the students.

Introduction

Our motive for this particular effort was to determine the parameters that can successfully replace the traditional ways of teaching in a High School, providing education of same quality both to urban centres and areas such as islands and mountainous villages.

First of all in terms of asynchronous education a Web Site was created. This educational web site is offering useful learning resources and teaching material. Teachers are able with a simple account (username and password) to publish educational material and students are able to access it. They can also evaluate their knowledge via on – line tests.

In terms of synchronous education, lectures based on video – conferencing, were designed and implemented. These lectures were concerning various lessons.

After the lectures were finished a questionnaire was given to students, in order to evaluate the whole process concerning both asynchronous and synchronous education.

Design and Implementation of the Courses

We gained experience in areas such as

- Setting up an educational web site. We used web – authoring and multimedia authoring tools in order to design and create educational material. This material was published in a Web – Server that was created for this specific purpose. In terms of cost, we can say that the

hardware and software for this project is rather very cheap. Actually only the hardware demanded some expenses since we used open – source software which is free of charge. On the other hand the preparation of the educational material demanded a great number of working hours.

- Implementing a video – conferencing lecture. We used Microsoft Windows Live Messenger for synchronous education. We chose this application because it is free of cost, it has been translated in Greek and satisfies all the requirements such as video calls, transfer of files, desktop sharing, whiteboard, application sharing. School computers in our country have as operating system MS Windows and thus they can use Live Messenger. In terms of hardware we used web cameras of 1.3 mega pixels resolution with set in microphones. We also used video projectors and light pens during the lectures. This hardware was rather expensive but nowadays every school has this equipment. The educational material was the one that had been developed for the asynchronous education.

Evaluation of the process

In terms of the preparation of the educational material, mathematicians and physicists claimed that was very difficult for them to correspond in the demands of this project since they had to deal with equations and shapes. The writing of above demanded too many working hours. Philologists found the writing less time consuming but they also marked that is rather a difficult project. We estimated for a lecture that lasts one hour, a preparation of six to seven hours is needed. This is an acceptable time for research but not for every day teaching. In order to solve this problem, we believe that in school of future the teacher of informatics has not only to teach students but also to guide and help their colleagues using ICT.

As it concerns the process of videoconferencing teachers made the following comments:

- Videoconferencing is "it's not just like meeting face-to-face" because we are exchanging only two dimensions of face-to-face communication. Moving your head in real world will enable you to see a different view of the person that you have been talking to. Doing the same in videoconferencing will not produce the same effect - you will continue to see exactly the same view (image), the one of the camera. In addition, network parameters (low frame rate, high latency and packet loss) may make some videoconferencing sessions impossible for normal human communication.
- There is need for a script. Videoconferencing is a different medium, there are different communication cues and rules, and consequently teachers' expectations and actions should be different too. The dynamics of the video session are not exactly the same as dynamics of face-to-face conversation, and teachers need to employ a higher level of management. An important part of preparation will therefore be

working out the dynamics of the session and the activities that students will engage in. Of course a script can be changed or abandoned if interaction between teachers and students demands it.

- There is a need of shorter presentations. The attention span in a videoconferencing session is much shorter than in face-to-face communication. This is especially true for High school students and so long presentations should not be planed.
- Having good audio is extremely important in sessions where participants will be conversing most of the time. Although the quality of both auditory and visual data is important, the imperfections in audio quality seem to cause more problems. If someone missed some words it is almost impossible to make a good guess of what the speaker actually said. This makes communication extremely difficult and disconcerting.
- Eye contact is extremely important for establishing the trust and naturalness in conversation during the session. It is best to have your camera as close as possible to the display area to enable the semblance of the eye contact that we normally maintain when we talk to someone.

Finally we gave a questionnaire to students to see the overall impact of videoconferencing and what are the most important parameters for them. The questionnaire was the following:

1. Had you ever experienced a similar procedure?
2. How easily did you adapt the new interactive method of teaching?
3. How easy was it for you to interact with your teacher?
4. Were there any queries from you?
5. And if so, was the teacher's feedback comprehensive?
6. How qualitative were the teaching materials that were given to you?
7. Do you believe that the new knowledge was presented equally comprehensively in comparison to the traditional way of teaching?
8. Could the teacher's natural presence be replaced sufficiently by the videoconference?
9. Do you believe that teaching will be more efficient if you participate again in a similar procedure?
10. How much interested was shown from you during the procedure?
11. Would you prefer having lessons like that?
12. Do you believe that this procedure must take place in other lessons too?
13. Was the size of the screen of the video appropriate?
14. Were the texts presented on screen readable?
15. Was the quantity of information presented on screen proper?
16. How good was the quality of the video?
17. How good was the quality of the sound?
18. Were there any problems due to interruptions and delays?
19. Do you believe the presentation ran smoothly?

Secondly, we implemented the statistical method factor analysis to the data collected through the questionnaire using SPSS.
Initially, we implemented the factor analysis to all the questions. Questions 1 to 12 are related to the evaluation of the impact of the videoconference on the students. More detailed, we searched if there was any possibility to replace the natural presence of the teacher with the videoconference. Moreover, we wanted to find out if the whole procedure motivated the students so as to show more interest to the lesson. As far as the questions 13 to 19 are concerned, they are related to the technical settings of the videoconference. More detailed, we examined the fact of how qualitative were the sound and the video according to the students. Furthermore, we wanted to find out if there were any interruptions and delays, and if the presentation ran smoothly. The extraction method was Principal Component Analysis. The results are the following:

Table 1: Communalities**,**

	Initial	Extraction
VAR00001	1,000	,545
VAR00002	1,000	,581
VAR00003	1,000	,749
VAR00004	1,000	,688
VAR00005	1,000	,601
VAR00006	1,000	,631
VAR00007	1,000	,729
VAR00008	1,000	,695
VAR00009	1,000	,638
VAR00010	1,000	,610
VAR00011	1,000	,666
VAR00012	1,000	,714
VAR00013	1,000	,694
VAR00014	1,000	,629
VAR00015	1,000	,557
VAR00016	1,000	,722
VAR00017	1,000	,592
VAR00018	1,000	,670
VAR00019	1,000	,682

At this point, we would like to highlight that every variable VAR00001 and so on, matches to a question. Having noticed the table above, we observe that for all the variables the value of variable Extraction is bigger than 0,4 and therefore all the variables were included in the statistical analysis, from which results came out.

Table 2: Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2,058	10,833	10,833	2,058	10,833	10,833
2	1,649	8,679	19,512	1,649	8,679	19,512
3	1,454	7,651	27,163	1,454	7,651	27,163
4	1,417	7,458	34,621	1,417	7,458	34,621
5	1,297	6,827	41,448	1,297	6,827	41,448
6	1,193	6,278	47,726	1,193	6,278	47,726
7	1,149	6,047	53,773	1,149	6,047	53,773
8	1,113	5,856	59,629	1,113	5,856	59,629
9	1,061	5,583	65,212	1,061	5,583	65,212
10	,968	5,093	70,305			
11	,907	4,775	75,080			
12	,809	4,256	79,336			
13	,736	3,873	83,208			
14	,642	3,377	86,586			
15	,609	3,207	89,792			
16	,548	2,883	92,675			
17	,504	2,653	95,328			
18	,483	2,544	97,872			
19	,404	2,128	100,000			

Table3:Component Matrix

	Component		
	1	2	3
VAR00001	,377	-,097	-,267
VAR00002	,539	-,244	-,300
VAR00003	,311	-,096	,007
VAR00004	,517	,024	,491
VAR00005	,263	,201	,122
VAR00006	,769	,133	-,161
VAR00007	,321	-,166	,313
VAR00008	,572	,180	,025
VAR00009	,263	,124	-,088
VAR00010	,378	,290	-,246
VAR00011	,316	,278	-,193
VAR00012	,478	,108	,058
VAR00013	,406	,435	-,139
VAR00014	-,298	,373	-,037
VAR00015	-,268	,365	,155
VAR00016	,396	,575	,099
VAR00017	-,120	,240	-,343
VAR00018	-,417	,351	,217
VAR00019	,311	,346	-,008

We also examined the table Component Matrix. We notice 3 factors. *Factor 1* **:**VAR1, VAR2, VAR3, VAR4, VAR5, VAR6, VAR7, VAR8, VAR9, VAR10, VAR11, VAR12

Factor 2 **:**VAR13, VAR14, VAR15, VAR16, VAR17, VAR18, VAR19

*Factor 3***:** No variable

As a result we confirm the initial theory, according to which, the questionnaire is divided in two dimensions. One of them includes questions 1 to 12 (named as *interest*) and the other questions 13 to 19 (named as *technical settings*). Subsequently, we implemented the reliability test to the 12 questions of the first dimension. The results are the following:

Table 4:Case Processing Summary

		N	%
Cases	Valid	103	100,0
	Excluded(a)	0	,0
	Total	103	100,0

Table 5:Reliability Statistics

Cronbach's Alpha	N of Items
,752	12

We notice that the value of variable ALPHA is 0.752, bigger than 0,6 and therefore our data are statistically significant .

Thereafter we applied a similar procedure to the 9 following questions of the second dimension. The results are the following:

Table 6:Case Processing Summary

		N	%
Cases	Valid	103	100,0
	Excluded(a)	0	,0
	Total	103	100,0

Table 7: Reliability Statistics

Cronbach's Alpha	N of Items
,788	12

We notice that the value of variable ALPHA is 0.788, bigger than 0,6 and therefore the data of the second dimension are statistically significant too.
It is highly significant to examine if there is any correlation between the dimension *interest* and *technical settings*. That is to say, if the questions about the sound, the video, the interruptions and the teaching materials tend to correlate with the interested that was shown from the students. For this reason, we created the means of each dimension. We matched the variable VAR20 to the mean of the dimension *interest* and the variable VAR21 to the mean of the dimension *technical settings*. While using the software SPSS and examining the correlation between the two dimensions, we reached the following conclusion:

Table 8: Correlations

		VAR00020	VAR00021
VAR00020	Pearson Correlation	1	,917
	Sig. (2-tailed)	.	,339
	N	103	103
VAR00021	Pearson Correlation	,917	1
	Sig. (2-tailed)	,339	.
	N	103	103

Obviously, there is a high correlation between the two dimensions.

Future Work

We plan to set up an educational platform such as dokeos. This platform offers: Build e-courses using templates, import SCORM courses, assess learners through tests and surveys, coach them through a rich palette of interaction tools, convert Word and PowerPoint documents into e-courses and organize videoconferences.

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