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Using educational webcasts in small multigrade schools of isolated islands

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ABSTRACT

In this study primary schools' educational system in small and isolated islands of Greece is presented. These areas are characterized by inaccessibility and isolation as it happens in most multigrade schools. For facing the difficulties of multigrade schooling, curriculums should be engaged with different learning strategies. In this case study conducted an investigation of the effectiveness of educational webcast as an auxiliary manner under multigrade schooling conditions. The research was carried out in six small and isolated schools in Greece. The field study compared mulitigrade traditional teaching to webcast enhanced multigrade teaching. The educational webcast was deployed to 22 primary school students. The results of the study indicated that educational webcasts can have a valuable contribution to multigrade primary schools students. The implications of the findings are discussed for practice and research.

Keywords: *Multigrade Schools, Primary Education, Geographic Isolated Islands, Rural Schools, Educational Webcasts, Within Group Experiment, Learning Effectiveness.*

INTRODUCTION

Every country has to deal with its educational problems, depending on the nature of the problem; each country works out for wide or local solutions. In many primary schools of Greece the population does not exceed 50 pupils. These schools have limited teaching staff and are named multigrade schools. Specifically, multigrade schools employ up to five teachers (there is not one teacher for each grade), who nevertheless are expected to cover the needs of a full school. As a result, there are mixed classes (classes with children of different grades), with two, three, or more grades in the same class. In these "small schools", the number of students justifies the employment of less than six teachers (even one or two).

Teachers of multigrade schools face significant challenges, as they have to teach more than one curriculum subject in the same class. Multigrade schools exist in many parts of the world, particularly in isolated and rural regions. Remote areas, such as, Pakistan, Zambia, Caribbean, West Australia and Greece have multigrade schools. The multigrade schooling in rural areas has been widely studied, and it is considered as a weakness of the educational system (Ludlow, 1998; Benveniste and McEwan, 2000). However, sometimes it is believed to have some advantages over single grade classes (Cook, 2000; Boss, 2000). The isolation and inaccessibility of many regions, due to Greece's many mountainous ranges and islands, have resulted in many small schools with many specificities (Tressou-Milona, 1996). The aim of this paper is to examine the usage of educational webcasts in an auxiliary manner in small schools in isolated islands of Greece.

Sometimes, students finish their work quicker than a teacher expects, or the teacher needs more time to prepare or work with another class. In those cases, some or all of the students are left with free time. If a teacher does not come up with an activity for the students, teaching and behavior problems might ensue. For the case of multigrade schools this problem is greater.
In order to cope up with the problem of students' "free time" in multigrade classes, a learning webcast was created, and then examined for the effectiveness of the pupils in contrast with their

ordinary effectiveness. Moreover, an interview with their respective teachers in order to identify the differentiation of their reaction from typical traditional teaching is conducted. Thus, the possibilities of giving a technological solution in one of the most important problems in multigrade schooling are examined.

This research aims to shed light in learning strategies of multigrade schools of small islands. Findings were expected to promote the evolution of technology in small schools and specifically the creation of learning webcasts on the courses of primary school. This paper is organized as follows. In the next section the educational development of the primary schools in small isolated islands and the case of the Cyclades complex of islands in Greece is discussed. In section 3, the educational webcast that was created for the experiment is presented. In section 4, the methodology as well as the empirical results derived is presented, while in the next section these results along with teachers' interviews are discussed. The last section of the paper raises the implications of the research and discusses several ideas for further research.

SMALL PRIMARY SCHOOLS OF ISOLATED ISLANDS

Cyclades complex of islands is a region in the Aegean Sea (figure 1). These islands are well known tourist destinations. Although, in the summer all these small islands are crowded, in other seasons most of them are neglected. These islands, due to inaccessibility and isolation they face several difficulties; one of the most important is the lack of educational services.

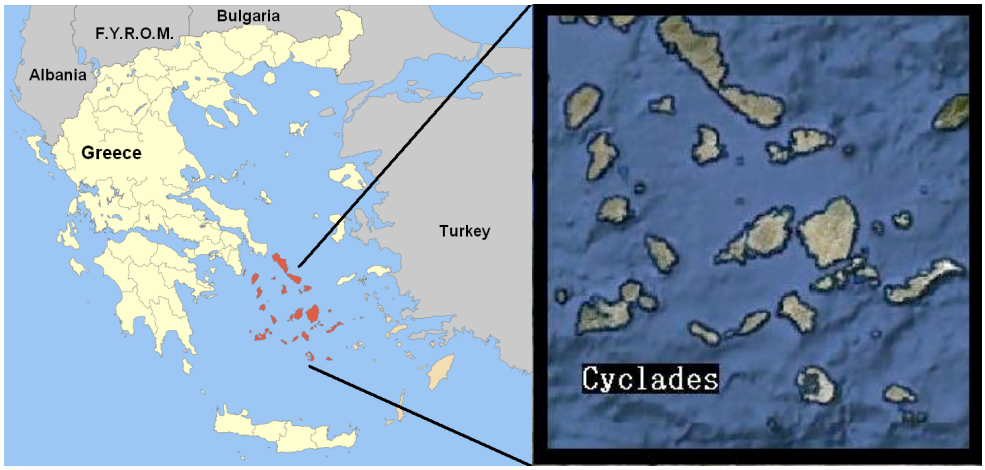

***Figure 1**: The Cyclades Complex of Islands*

In the case where the number of pupils does not justify one teacher per grade, two grades become one and they are co-taught. Grades which are used to merge are third with fourth and fifth with sixth. Amalgamation is usually avoided in first and second grade, because pupils are still young and need teachers' undivided attention. Thus, in case of two teachers' (which is the most common) the allocation which is used to happen in grades is the following: first, third and fourth in one class and second, fifth and sixth in the other class. This way of allocation of grades has the advantage of smaller age difference between children of a merged grade. In figure 2 (left), one of the most widely used classroom designs is presented. The figure represents the case of a two-grade school; there is one grade in the raw of three decks (first or second) and two merged grades in angle decks (third with fourth or fifth with sixth).

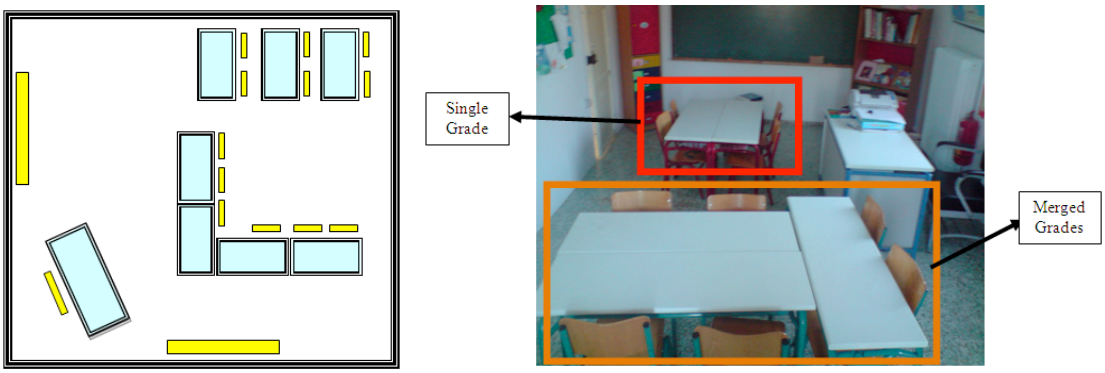

***Figure 2**: Typical design of a multigrade classroom (left), an example of a multigrade classroom from the experiment (right)*

Despite the difficulties of the multigrade schooling (Ludlow, 1998; Benveniste and McEwan, 2000), researchers have admitted advantages regarding the collaboration between grades and cognitive advantages of multi-age classes (Veenman, 1995; Psacharopoulos et al., 1993). Indeed, in many cases of multigrade schools, pupils with different ages may work together and achieve knowledge. For instance, figure 2 (right) shows a multigrade classroom and how it is scheduled, for promoting collaboration between ages, especially in merged grades.

In that study, a school with three or fewer teachers is defined as a "small school". Additionally, an island with less than 2000 permanent inhabitants is defined as an "isolated island". Moreover, the investigation was focused on schools with two teachers and two to five pupils at each class. These schools were chosen because they are the most common case in the isolated islands of Cyclades and as a result the results will be more representative.

The terms "small schools" and "isolated islands" are used in every country to describe schools with a small number of students which are located in islands with difficult access. However, the exact number of students that characterizes a school as a small one varies from region to region. Moreover, the characteristics of isolated islands also vary from country to country.

Multigrade schools are common in many parts of the world, particularly in isolated and rural areas. For instance, there are multigrade schools in isolated islands such as Cyclades, Turks and Caicos, Solomon and Caribbean (Berry, 2001; Veenman, 1995) and in rural areas such as Togo, Turkey, Burkina Faso, Pakistan and Zambia (Veenman, 1995; Lungwanwa, 1989; Aksoy, 2008). Multigrade classes are often neglected on curriculums because it is seen as a not very likely and special case (Little, 1995).

THE EDUCATIONAL WEBCAST

Webcast may simply be defined as a dissemination medium of recorded or live content. Mishra and Khan (2009) provide the following good working definition*: "Transmitting video and audio streams over the Internet allows events such as lectures, seminars, and webinars, to become available to users in remote location"* (p.85). Educational webcast is an important tool which gives an enhanced learning experience to students. Empirical studies (Giannakos et al., 2011) have shown that students learn and communicate better from words and pictures than from words

alone. Moreover, there are many educators (Bell, 2003) and the majority of students (Giannakos and Vlamos (a), 2012) that advocate the use of webcasts for learning purposes.

In the present paper, an asynchronous webcast was employed. The use of asynchronous webcasts could benefit students by enhancing in their learning, especially in multigrade classrooms. Webcasts not only provide students who have missed a lecture the opportunity to catch up, but also enable others, especially slow learners, to review difficult concepts. Related attempts have been made for training special educators in rural areas (Ludlow and Duff, 2002) and in students of elementary schools (Giannakos and Vlamos (b), 2012). However, this medium could benefit the learning processes in multigrade schools. In our approach, teachers were focused on one grade and in the same time, the other grade watched the educational webcast. The crucial question is how effective the educational webcast is in these ages and whether pupils can concentrate in order to watch the webcast.

In order to examine the above objectives an experiment with real classroom conditions is conducted. Firstly, six small schools with two teachers each one were chosen. Following, the investigation was specified in the fourth grade in the course of history. Subsequently, the educational webcast (Figure 3) based on the curriculum of the ministry of education (Greek Pedagogical Institute, 2010) in the section of "The ties that bind the Greeks" was developed. In particular that section describes all the historical cultural events that bind the Greeks (i.e. Olympic Games, Amphictyonies). Furthermore, the teachers create a test similar to the previous ordinary tests (in terms of the type and the size of exercises), in order to measure the effectiveness of the webcast.

***Figure 3**: A snapshot from the Educational Webcast*

METHODOLOGY

Sampling

The research methodology included the educational webcast created through the proposed curriculum of the Greek ministry of education (Greek Pedagogical Institute, 2010). Twenty-five different small schools in Cyclades islands were randomly asked to participate; six of which finally responded. The sample of the pupils was composed of twelve boys and ten girls; all pupils were

ten years old and attend the fourth grade of primary school. They were taught the same syllabus and they attend three-grade schools (two teachers). The experiment was conducted during the first two weeks of November 2010.

Procedures

The experiment took place under real multigrade school conditions. However, teachers were working with the other grades of the class while pupils of the fourth grade were watching the educational webcast using headsets and laptops at their desks. This content selection was made with the assistance of the respective teachers and due to the great degree of content fragmentation and the visualization ease. The traditional learning was conducted based on the instructions given by the Greek Ministry of Education (Greek Pedagogical Institute, 2010) for the course of History. In particular, the traditional teaching method was based on teachers' lecture in conjunction with discussion with the students' (mostly answering students' questions). The main differences between the two teaching methods were the interactivity with the teacher in the traditional learning and the potential technological benefits (the graphics, the images, the design of the systems screen and the text flow) in the webcast based learning.

Measures

The main measures of the study are the cognitive tests. Cognitive tests were used to measure both traditional teaching and webcast based learning effectiveness. In both cases four types of tasks were used. The first one was a multiple choice questions task. There were three questions and each question had three possible answers to choose. The second task was a matching exercise and it had one sentence on the left side and five qualities on the right side. Pupils had to match the sentence with the correct qualities. The third task was a true or false exercise that constituted of four sentences, from which two were false and two were true. The last task had three sentences with seven gaps on them and at the top of the exercise there were seven words. Pupils had to fill the gaps with the correct word. All tasks and all questions of the tasks were equal in terms of score with a total maximum score 10. As such, each task represents the 2.5 of the total score. The cognitive test used to measure webcast based learning effectiveness is presented in the Appendix.

Research Findings

As mentioned earlier, twenty-two pupils from six different primary schools (four schools with four pupils and two with three) from the fourth grade (10 years old) were involved. Based on the effectiveness from their previous ordinary tests, we conduct an analysis to examine the following Hypothesis. The null Hypothesis (H_0) was that: the effectiveness of traditional teaching has no significant difference from webcast based learning. The research Hypothesis (H_1) was that: The effectiveness of traditional teaching has a significant difference from webcast based learning.

In order to test the previous hypothesis the Brown-Forsythe method was employed. The effectiveness of traditional teaching was (M=8,77; SD=1,21) and the webcast based learning was (M=8,59; SD=1,2). Brown-Forsythe method was chosen, because we do not need to check the homogeneity of variances and we can extract reliable results with sample even smaller from 10 (Brown-Forsythe, 1974). Using Brown-Forsythe, there was no significant difference between traditional teaching and webcast learning effectiveness, **Brown-Forsythe (40) = ,125, p>0,05**, even if the former is an interactive way of learning.

***Table 1**: Hypothesis Testing using Brown-Forsythe method*

Webcast Based Learning		Traditional Teaching		Brown-Forsythe			Result
Mean	**S.D**	**Mean**	**S.D**	**Statistic[a]**	**df**	**Sig.**	
8,59	1,20	8,77	1,21	,125	39,996	,727	Insignificant Difference

TEACHERS' INTERVIEW AND DISCUSSION

As to the teachers, all of them were particularly impressed by the effect that the webcast had on the students. Especially, on those students who previously paid no attention in courses and were not easily disciplined in class. The teachers reported that these students seemed absolutely absorbed by the webcast and kept watching quietly without disturbing or talking to anyone. In general, the teachers thought that the use of webcasts and computers was very profitable in these multigrade schools, because one grade could work silently while teacher works with other grade on a different subject. Furthermore, teachers thought that students who had watched the webcast seemed so immersed that their behavior in class had changed and they had appeared to be very satisfied and interested in the educational content. Moreover, teachers were very happy with their students' performance on the test and they said that they would certainly wish to include webcast in educational procedures.

Students' support for continuation of webcasts was very positive, as it has been recognized in the literature (Tynan and Colbran, 2006). Indeed, some of the students suggested that they might even watch the webcast "on their own laptop in classroom" and that they could "even use it at home in order to study". Moreover, students came to ask for "the possibility of other webcasts in other courses". In addition, students indicated that they like webcast lectures, and they mentioned number of possible problems such as: "I need to buy my own computer," "I do not have a headset" and "My brother does not allow me to use his computer". The strong support from students is likely to enforce our attempt in order to examine in depth learning strategies for using webcasts in schools.

As it has been previously observed (Scutter et al, 2010) webcast has the advantage that information could "get into students head". Tan (2007) mention that re-listening the webcast course does not only give students who have missed a lecture the opportunity to catch up, but also enables others, especially slow learners, to review difficult concepts.

The study is one of the few studies which examine the cognitive achievements in multigrade classes. Although, this study does not compare multigrade to monograde classes, but typical multigrade teaching to webcast enhanced multigrade teaching. Furthermore, our empirical results indicate that, in pupils' "free time", due to the policy of multigrade teaching, we can have a technological solution, which was considered as well effective and acceptable, based on pupils' learning way.

Several projects such as; Escula Nueva (Psacharopoulos et al, 1993), MUSE - MUltigrade School Education (Little and Pridmore, 2004), Rural Wings (Koulouris and Sotiriou, 2006) and NEMED – NEtwork Multimedia EDucation (Koulouris and Sotiriou, 2006) have been explored issues concerning the multigrade schools and teachers; training and collaborative technologies. Our attempt to investigate the multigrade schooling in small and isolated islands provides a simple

and low cost solution in order to cope up with some of the difficulties of multigrade teaching. Also, our empirical results identify educational webcasts as an effective learning medium which, practically, can be enhanced in multigrade teaching.

CONCLUSIONS

This article presented the primary education of small multigrade schools in isolated islands of Greece. By investigating the small and isolated multigrade schools, it is attempted to provide useful insight for other isolated and rural multigrade schools, which have several similarities. That study is one of the few studies which examine the education in small primary multigrade school of isolated islands.

The empirical results identify good performance at training with educational webcasts. Comparing the effectiveness of webcast based learning with the ordinary-traditional teaching effectiveness of the students, it is observed that there is not a significant difference between them. Students generally enjoy watching webcasts, and stay silent. However, a matter that could be argued is that a well designed webcast will be a very useful tool that can help sometimes. Especially, knowing the situation of the education in primary multigrade schools of isolated islands, we admit that webcasts have much to offer.

Although findings provide meaningful implications for the education in isolated multigrade schools of small islands, the study has several limitations. First, the study was carried out in six schools of Greece and the sample was only twenty-two pupils. Even if we used strict rules in our sampling, its results may not be easily generalized to all isolated multigrade schools of small islands. Second, these experiment results, with the specific grade (fourth) and course (history) provide us an overview, but could not easily generalized to other grades and courses. Finally, we have not taken into consideration the possible effect of the continuation of educational webcast into pupils' effectiveness. However, we know from literature that when webcasts are available, students typically use them without attendance wearing off greatly (Brotherton & Abowd, 2004; Traphagan et al, 2010). Nevertheless, we try to eliminate the effect of the two weeks study by using educational webcast once a week in the last 4 weeks before the experiment. Based also on the results of Traphagan et al (2010) we can assume that after the third week the attendance of the students stabilizes.

Future research might draw from a wider sample of students to ensure that the sample is even more representative of the typical small and isolated school. Also, another study with different courses and different educational levels might draw several important conclusions. Last but not the least, for further research is subjected the examination of educational webcast's impact through a hybrid framework of technologies such as: social networks and virtual reality games. Possible integration with these technologies may create positive learning outcomes and promote several implications.

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APPENDIX: The Cognitive Test

1. Multiple choice questions:

- **The Olympic champions after their victory when they came home they entered into the city by:**

A) The main gate
B) An opening in the walls
C) The regular gate

- **The Olympic champions after their victory crowned with:**

A) Olive branch
B) Orange branch
C) Fig Tree branch

- **The Olympic Games were held every:**

A) One year
B) Two years
C) Four years

2. Match the sentence with the correct qualities:

The ties that bind the Greeks were:

A. The Pan-Hellenic Games

B. The Wars

Γ. The Oracles

Δ. The Amphictyonies

E. The Education

3. True or false exercise.

☐ Before the opening of the Olympic Games, messengers carried the message of the games in all cities.

☐ The oracles, as saying the answers gave the Pythia had always clear meaning.

☐ The ancient Greeks specially honored their Olympic champions.

☐ The Greeks did not want to predict what will happen in the future.

4. Fill the gaps with the correct word:

(soothsayer, augur, oracle, decision, prophets, prophecy, Delphi)

The most famous …… of Greece was ……

…….. gave …… to help people in some difficult situations to take ……

I like to try to …… at the end of the story. I fell like a little……..!