Improving the quality of education in Greece's multigrade schools: The role of information and communication technologies

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Abstract

multigrade schools are a reality in Greece, with many problems and particularities. Information and Communication Technologies can provide solutions in many of these problems. The quality of ICT based education in multigrade schools depends on the tools, content, and mainly by the time management that is required in every action in a multigrade school. Time management reflects upon the preparation for teaching, during the lessons and in the administrative duties of the teachers. We propose a series of steps and solutions adapted to the needs of multigrade schools, derived from the experience acquired during a two-year project named SXEDIA. Based on the deductions of that project, we are about to carry into effect the project MUSE and very soon, the project SXEDIA II, projects that are holistic solutions towards the problematic nature of the of Multigrade schools in Greece.

1. Introduction

multigrade schools in Greece are a necessity mainly due to the country's specific geographic configuration. There are a lot of mountainous regions and large number small islands in the country. In the past, historical reasons, had forced the population to live in areas of difficult access, scattered in a great number of small and isolated villages that were located either deeply in the mainland, or in small islands. Even though nowadays, there is a change in the demographic dispersion, there is still a significant percentage of the population that still lives in the above described regions. This creates the need of having schools operating in small villages, even with a very small number of students and even when the conditions do not provide the ideal educational environment.

Nowadays, there is a tendency to reduce the number of multigrade schools. The most common practice is to merge neighbouring schools, providing transportation to pupils on a daily basis to a main village in a "hub" or "centre" school. But mergence (a) is not a choice of the inhabitants of the small villages and (b) does not exist as an option in the case of small islands where there is only one school. Moreover, mergence is strongly opposed by the residents, who consider the school, together with the local church, to be the traditional cornerstones of the village's cultural and social life. They believe that if the school stops operating then the status of the village will be reduced and this will negatively affect its future. Their point is that a school is always a vivid cell and a vehicle of civilization that helps keeping the local population in place, preventing depopulation.

Sustaining a large number of multigrade schools is a difficult task. The problems that arise can be epitomized in two categories, the financial and the educational [1]. On one hand, the state has to provide the necessary economic means in order to keep schools fully equipped and in an acceptable operational condition. On the other hand, there must be adaptations in the curriculum; in order to fit in the way teaching is conducted in multigrade schools. These adaptations often lead to the belief that the quality of the provided education is inferior, compared to the quality of education in the rest of the schools [2]. We believe there are a number of interventions that can be made to raise the quality, involving the extensive use of information technology.

2. Addressing the problem

Out of 5800 elementary schools in Greece, 2558 have five or less teachers, at least one less than the number of grades. Around 1800 schools have one or two teachers. More than 1300 schools operate with less than 20 students (table 1). This means that more than 40% of the elementary schools in Greece are multigrade and with a small number of students. According to the relative legislation a class can be split in two if it has more than 25 students. The same applies for a school as a whole: if a school has less than 25 students in total, it operates with only one teacher, regardless of the number of grades that he/she has to teach. If the school has up to 50 students, a second teacher can be appointed and so on. Statistically the situation is not as bad since these limits are rarely met and the numbers of pupils per teacher are less than the above.

Total Number of schools in Greece				5.881	
Total Number of multigrade Schools				2.558	
Percentage of Multigrade schools in Greece				43,5 %	
Grade of schools	1	2	3	4	5
Schools per grade	935	871	534	138	80
Percentage of each grade	15,9	14,8	9,1	2,3	1,4
Number of teachers	935	1742	1602	562	400
Number of students	8187	22247	19534	7602	4127

Table 1. General statistical data for multigrade schools in Greece

Not all multigrade schools are similar. There is a possibility that in a small school, a grade is missing, simply because there are no pupils to attend. It is also likely that a multigrade school has one teacher teaching up to six grades, two teachers each one having to teach in up to three grades, three teachers each one having to teach in up to two grades, four teachers with some of them teaching two grades and, finally, five teachers with one of them teaching two grades.

There is also a certain way that grades are allocated to each teacher. In the case of two teachers, one teaches grades 1, 3 and 4 and the other grades 2, 5 and 6. In the case of three teachers, one teaches grades 1 and 2, the other grades 3 and 4 and the third grades 5 and 6. In case of four and five teachers, care is taken so that the first and second grades are taught separately. It is not an unusual situation for a pupil to attend a next grades' curriculum first and in the subsequent year to be taught the lessons of the previous grade.

The most demanding type of multigrade school is a single teacher school. Teaching in that kind of school is a difficult job. The approach adopted in general is that when the teacher teaches one grade, the rest of the pupils work by themselves or in groups. Due to the small number of pupils, the most common instructional method is cooperative learning, mixed with elements of self- learning. Working hours are extended and some of the breaks are skipped so that more teaching time is gained, though the truth is that in these cases, no matter the effort, the teacher spends less teaching time per grade, than in an ordinary school. Another method is to use peer teaching, with one or two of the best students acting as teaching assistants.

In order to meet the increased demands of his instructional duties, teachers have to be well prepared. They have to plan ahead and be exact on how and when to administer specific parts of the syllabus. Since the schoolbooks are the same as in any other school, there is a considerable work for the teacher who has to deal with different grades. It is easy to understand that the teacher acts under great pressure.

Another problem of multigrade schools is the fact that some subjects are not taught at all. For example, there are multigrade schools in which foreign language is not taught, though this is part of the primary schools' curriculum. In most of them, a specialized teacher does not teach art and music as in the rest of schools. The same applies for physical education and many of the school activities are skipped and everything is left to the initiative of the teacher. These differentiations exist at the expense of quality.

In an ordinary school, the headmaster has very few, if any, teaching duties, and is concentrated in purely administrative work and liaising between the school and local authorities. This kind of job is time-consuming but also very important, particularly since local authorities are responsible for schools' maintenance. In multigrade schools, usually there is no headmaster but a teacher "acting as headmaster", having the double role of manager and teacher. This means that besides their teaching duties, multigrade schoolteachers have a great deal of administrative work.

Given these difficulties, one would expect that the state would employ skilful and experienced teachers for multigrade schools. This is not the case: The vast majority of them are newly appointed or on contract (not permanent job). They have very little experience, if any, and they are not trained for multigrade teaching. Studies for multigrade schools are not included in the academic courses of nearly all Greek Universities and no specific in-service training is provided for multigrade schoolteachers. In

multigrade schools with one teacher, since there is no help from any colleague, the teacher has to face any arising problem alone.

Finally, apart from the teaching experience that the teacher gets, there are very limited incentives for a teacher to stay in a multigrade school. The most important of them is the fact that they get more points within the context of a point system that forms the basis for teachers' evaluation. These points help the teachers to have a choice later in their career mainly when transferred from one school to another.

3. Applying ICT in multigrade schools

The role of ICT in education is significant in general but can be decisive in the case of multigrade schools. There are three areas where this role is distinguished, namely (a) teaching (b) training and supporting teachers and (c) administration [3].

To use ICT in teaching includes various tools and methodologies as: Commercial software readily available, tailor made software for specific subject teaching, televised lectures to be presented off line or video on demand, videoconferences, on line connections with others schools, on line and off line exercises and didactical material.

For teacher training: On line lecturing and consultation, on line and off line material and references specially selected for the instructional needs of a multigrade school can be used.

For the treatment of administrative problems, templates of all the documents a school uses with instructions when each one is used, on/off line communication with the educational and local authorities, are among the solutions that can be considered [4]. Of paramount importance is the support that is needed to all of these activities –educational, technical, administrative- by any supervising authority.

The introduction of ICT in multigrade schools is related to some difficulties, which are presented below.

Since ICT applications are based on an extensive use of the Internet and other means of on-line communication, school units should have computers and Internet connections as minimum prerequisites before the ICT introduction. Though this appears essential, in practice, computers are not always available, or are available but inadequate even though every school has at least one simple (PSTN) telephone line. ISDN is the only broadly applied choice for on line communication and especially for videoconferencing. All the restrictions that the limited bandwidth imposes, apply in this case. Few schools are connected with ISDN lines, even though a lot of them are in the process to be connected in this way.

The standards of the E.U. specify that the ratio of computers per students must be 1 to 25 (1 to 20 in the year 2006). Following this ratio, every Greek school with 25 pupils in one class should have at least one computer lab. In case of multigrade schools, where the class may be small, the above-mentioned ratio has no meaning. In such schools usually there are no extra rooms available to be used as computer labs, yet the machines are needed in the class where teaching is conducted. The standards for the number of computers for a multigrade school have to be established according to the number of teachers, grades and working groups and not according to the total number of students. The smaller the school, the smaller the ratio pupils/computers should be.

The policy concerning computers in elementary schools is recent in Greece. "Society of Information", is an extensive strategic scheme concerning the introduction of ICT in many fields of life. Within this framework it is proposed that elementary schools should apply to establish computer lab with Internet connection. The number of computers in such a lab depends on availability of extra rooms and the number of students, criteria that are not met in most multigrade schools and certainly not in single teacher schools. The way of financing ICT is bureaucratic and leads to delays.

It is clear that bureaucratic and centralized policies are major barriers for applying ICT in multigrade schools. It depends mainly on the teacher who acts as a schoolmaster as well as to the other teachers to take initiatives, at the school's benefit. Good public relations with local authorities and the local

community help a great deal. Interestingly enough, it seems that these practices are effective and, despite the difficulties, many schools are nowadays equipped with computers, which were acquired using funds that (a) were directed for this purpose from the central educational authorities to local authorities, (b) were available for this purpose in the budget of European or national pilot projects in which a school participated and (c) were offered through donations [5].

Providing schools with computers is one issue, ensuring their usage is another. Teachers use a computer if (a) they know how to use it (b) they are persuaded that it is a tool in support of their teaching duties and (c) they realise that ICT's may potentially support other duties that they have in their multiple role at school. These dimensions are analysed below:

As far as (a) is concerned, the most decisive factor for multigrade schoolteachers to learn how to use ICT effectively is schoolteachers' training, and, in this context, on-site teacher training, though a costly practice, seems to be the best solution. With training *in situ,* there is no need for teachers to travel, their teaching duties are exercised during the training period and training is offered on an individual basis which in many times proves to be efficient. Moreover, *in situ*, the trainer ensures that computers are properly installed, solves any technical problems and gives instructions on how to cope with everyday problems. At this point it is worth mentioning that in multigrade schools the "plug and play" concept is priceless. Hardware and software must come pre-installed and ready to use. Taking for granted that schoolteachers have no previous experience with computers, the whole interface must be as friendly as possible. Helpdesk and technical support by telephone must be constantly available and the schoolteacher should be confident that there is always someone to help if something goes wrong.

As far as (b) is concerned, proving the importance of computers as educational tools is a difficult task. Given the extreme time pressure within which schoolteachers in a multigrade schools work, ICT can provide quick and practical solutions in actual problems.

An example of such an application is the development of a database with exercises and activities for all the grades. The teacher can plan the day's work selecting from the database the appropriate material for the appropriate grade. Thus, the pupils of one grade can work on their own on paper or with the computer the selected exercises, while the teacher teaches another grade.

Such databases, which can be on line and freely accessible, so as to be enriched with new exercises and activities, are useful particularly in cases of inexperienced and newly appointed teachers (who are profiled frequently in multigrade schools).

In multigrade schools, a common practice within the teaching context is that, when the schoolteacher is engaged lecturing one grade's pupils, the rest of them divided in groups, are engaged in preparing exercises or studying previous or next hour's lesson. Educational software is useful in this case, particularly if specifically prepared for the purpose of this time-sharing type of studying. Commercial educational software is also a good and practical solution, but has the disadvantage of not being directly referred to the contents of the school's curriculum; hence it can be used as a supplement to ordinary teaching approaches as well as a basic instrument in student- centred activities, such as the preparation and presentation of a project in the classroom. Moreover, if pupils deal with educational material not necessarily referred to the curriculum, it is difficult for the teacher to check whether they are studying or not. For providing educational material directly adjusted to the school's curriculum, there are several solutions:

- A simple way is to convert text books into e-books; this is not a desired solution, since it does not give ICT instruments the chance to offer to pupils something different and more attractive compared with conventional educational material.
- Another way is to form a comprehensive library of commercial educational software, with detailed information about the parts that correspond to specific sections of the school's curriculum. This partially solves the problem.
- Another approach is to rely on synchronous teaching (videoconference) by a distant teacher, who covers all parts of teaching process.
- Finally, asynchronous teaching (web pages) can be implemented, a technique that gives similar results as in videoconferencing from teaching point of view [6].

These practices in their combination provide tools that guarantee quality of teaching and facilitate multigrade schoolteachers in doing their job.

In parallel, schoolteachers should be convinced that horizontal communication with schools, organizations and other institutions in a number of ways (e-mail, web pages, and videoconference) helps them, supports pupils, provides access to information and reduces isolation. Cross-school activities, lecturing and direct communication with experts can help teachers to promote quality of teaching and to face a number of problems.

With respect to (c), it is important to bring evidence that ICT helps teachers to implement various administrative duties like students records, calendar of events, certificates etc. All these can be produced in a very efficient manner after templates for all the necessary documents have been developed. As far as communication is concerned, given the adverse geographic conditions, multigrade schools' post is usually delayed so that teachers and pupils are not informed on time about activities and projects in which they would probably want to participate. It is clear that on line communication is expected to improve the situation.

Finally, it is worth noticing that there is a need for a platform for delivering the content addressed to teachers and pupils. An effective platform comes in the form of a simple portal-like web site. A portal is a web site that is intended to be an all-in-one entrance to the Internet, which also provides Internet services: email, chat rooms, free personal web pages, guides, calendaring, etc. Portals provide a single point of access to aggregated information. The main reasons for using such a site are:

Presentation. It provides a single consistent interface across diverse content and function. Provides common user interaction model and API, which new applications can build on. Delivers a common user experience across different device form factors.
Access. Provides common access mechanism for users to a range of applications (single sign-on). Allows different classes of users to have different levels of privileges, mutable and manageable. Provides access in a continuously available, responsive environment
Personalization. Permits customisations in the interface, to fit each user's specified preferences. Allows portal management to tailor the user experience for different classes of users, based on both implicit and explicit preferences.
Administration. Allow multiple organizational units to create and contribute content and to administer sections of the portal. Allows a central management entity to manage multiple portals across the entire organization

4. Projects related to ICTs and their role in multigrade schools.

It is believed that there are strong social and educational reasons why the field of ICT in multigrade schools should be investigated, and for this reason a number of projects have been designed, developed and are executed (at various phases in their timetables). Some of them are worth presenting here.

The SXEDIA project.
The usefulness of ICT in multigrade schools may be examined through the experience gained from the implementation of SXEDIA project. This project, funded by the Ministry of the Aegean, has been developed in 2000, as a pilot program with the task to introduce ICT applications to schools of the Aegean (which in their majority are multigrade). This program involved the installation of computers in 46 schools in 32 small islands of the Aegean Sea. It also involved the connection of the schools to the Internet, teacher training, work with educational software, development of web pages to represent the schools and help them to communicate and finally, distance learning from the University of the Aegean in Rhodes, using synchronous and asynchronous teaching methods.

Part of SXEDIA's success may be attributed to the fact that: (a) specific care was taken for every school separately and the activities were individualized according to the specific characteristics and needs of every school and (b) close links of communication have been developed between the support team and the teachers. The training approach and continuous contacts, either face-to-face, or through videoconferencing, e-mail and telephone contributed highly in the project's efficiency. All those that participated in the project felt as members of a team that worked for their own benefit and not because they were obliged to do so.

During implementation, one of the problems faced was the fact that a large number of teachers serving in multigrade schools were not staying in their posts for more than a year. This had a negative impact on the schools' network operation, since it was necessary to provide training to the new teachers so as to become quickly familiar with the way in which the network operates and to start using them with no delay.

The MUSE project

The MUSE project (multigrade School Education), funded by the E.U., aims to develop an in service training program especially designed to meet the needs of multigrade schoolteachers and to improve educational performance in multigrade school environments. Training is based on an innovative methodological approach for multigrade school teaching and on an extensive use of ICT applications so as to provide:

- A flexible, interactive in-service training programme for teachers of multigrade schools.
- The development of a platform for training, collaboration, networking and exchanging of ideas between teachers, students and trainers.

The MUSE project will provide continuous training and support to multigrade schoolteachers, enhancing communication among remote multigrade school teaching environments. The development of the proposed training program will be based on the adoption of a teacher centred approach. Implementation of the training program will include extended cycles of school centred work. Teachers will continuously give feedback to the academic team about their experiences gained in the classroom. This will not only will motivate teachers, but also provide the necessary cross-links between theory and practice. Upon suggestions of the teachers, the academic team will perform the necessary adjustments to the proposed approach. The duration of the project is two years.

The SXEDIA II project

SXEDIA II, which is currently at the planning stage, will integrate the experience gained by SXEDIA and MUSE, in a wider target group. This means that:

(a) A large number of schools will be involved from all part of Greece
(b) Apart from teachers and pupils, the project will be addressed to the entire local society of the area where the school belongs. It is one of the project's aims to make the multigrade school a centre of the society's activities.

Specific aims of the project are:

- Production of exercises, practical educational activities and working plans adjusted to the needs of multigrade schools. These will cover the modules taught in these schools.
- Extensive support of self- education and of education of pupils that face learning difficulties.
- Development of a system of multigrade schools' management.
- Development of links with public services
- Development of plans of activities at the community's service.

5. Conclusions

Drastic constraints concerning teaching time per student, intense fragmentation of the teaching procedure, lack of coherence, the need for time- sharing so as to meet the needs of a non-homogeneous class, make the multigrade school a very demanding professional area. The teacher of such a learning environment is called to unify diversified groups, set objectives for more than one grade, transform heterogeneous groups into collaborative teams and integrate pupils into a functional entity.

In teaching multigrade schools ICT is an indispensable tool that can provide solutions that improve the educational services offered by these schools. In many instances ICT is used less by the people that need it most. The main purpose of the above projects is to indicate in practice that ICT is needed in multigrade schools and should become a basic ingredient that has to be included in the design of a new curriculum for these schools. Multigrade schools, irrespectively of their reducing numbers, will be present in the educational scene for a long time yet, either as a necessary handicap for some or as an interesting pedagogical experiment for others.

However, multigrade schools have little chance to be the priority in educational planning within this institutional framework. To change the situation a change in attitude could be involved. Changing the

attitude with respect to multigrade schools is a big challenge and ICT could work positively in this context.

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