

E-Learning as an Educational Strategy on Islands With Low Population Density

Case Study in the Autonomous Region of Azores

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Abstract—The Regional Department of Education and Culture of the Autonomous Region of the Azores in the 2003-2004 school year implemented an innovative project for adult learning. The school EB 3/S Vitorino Nemésio, a public school, on Terceira Island, became the first Portuguese school offering adult education mediated through the Internet, serving elementary level (5th grade) to the secondary level (12th grade) adult learners. This research strives to understand to what extent media-based adult education provides an effective answer to geographic and demographic adult education issues in the Azores. Results indicate that this system appears to meet the geographical and demographic needs of the Azores Islands. Nevertheless, there are still unsolved problems related mostly to teacher limitations, more specifically pedagogic and technical skills in the fields of Information and Communication Technologies and e-learning. Adult e-learning also offers the possibilities of teacher and staff continuous training as well as its wider and more effective implementation outside the region.

Index Terms—e-learning, distance learning, adult education, low population density.

I. INTRODUCTION

The Autonomous Region of Azores (ARA) is an island archipelago that consists of nine islands with very disparate territorial areas and populations. São Miguel, the largest and most populous island in the archipelago, has an area of 745 km². According to the last General Population and Housing Census it had a population of more than 131,609 residents. In contrast, Corvo, the smallest and least populated island, has an area of 17 km² and a population of only 425 inhabitants [1].

To overcome the constraints caused by geography and demography, the Regional Department of Education and Culture (RDEC) of the ARA implemented an innovative adult education project during the 2003-2004 school cycle. The school, EB 3/S Vitorino Nemésio, on the island of Terceira, became the first Portuguese school with adult education mediated through the Internet, including studies from the 5th to 12th grades. This project is significant because of its innovative nature and long period of operation, as well as its generalised implementation across the entire ARA and peninsular Portuguese and emigrant communities.

This article provides a global assessment of the manner in which this project has been implemented in the territory

and results. The following sections will provide answers to the following questions:

- How has e-learning been implemented?
- How did the actors in the process operate?
- How are the teaching and learning activities progressing in this environment?
- What examples of sharing or collaboration have been witnessed among the different elements (RDEC, school, teachers & students).
- Has the system facilitated learning?
- What is the future development of e-learning?

II. METHODOLOGY

The objective of this investigation is to answer questions relating to a contemporary system about which there is little information. The development of a *case study* appeared to us as an appropriate way of approaching the problem under study, in that it allows a detailed observation of a context or specific happening [2].

The objective of this study is to describe and analyze tutoring activities in mediated adult education courses in the ARA and discuss implications for the teaching/learning process. The model followed is of an exploratory nature in that it seeks gain insight and understanding of a specific context [3] [4].

To this end, we interviewed the following people:

- The regional director of education (E1);
- The Technical-pedagogical advisor and coordinator of mediated adult education (E2);
- Seven teachers, who at the time at which the field study was carried out, in May 2008, were teaching in mediated adult education (E3). For the teacher interviews (E3), we selected seven teachers from different areas and with different levels of experience in e-learning. We did this to have the most heterogeneous sample possible so that we could cover the widest range of situations possible. Rather than achieve statistical significance, the aim of the interviews was to obtain relevant data. The aims of the information obtained were:
 - To outline a profile of the teachers regarding skills in the fields of Information and Communication Technologies (ICT) and *e-learning*;
 - To characterise the type of tutoring practised;

- o To assess the type of sharing and collaboration between the instructors.

To assess mediated adult education in the ARA, we reviewed literature that covered the four areas considered by INOFOR (2002) [5], as seen in Fig. 1.

To assess the four different areas, we considered the proposals of different relevant authors [6], [7], [8], [9] [10] and we selected a set of items that appeared relevant to us in meeting the objectives of the study. From this review of the literature, we created a direct observation grid, whose main goals are:

- To provide a framework to the system in theoretical terms, in what concerns to some of today's most significant proposals;
- To define the system assessment process, in a clear way, once different authors present several proposals for categorisation in different areas;
- To enrich proposed improvements to the system by comparing the characteristics of the current system and what is proposed by specialists who contribute towards identifying weaknesses, and ways of overcoming them.

The filling in of the ARA mediated adult education items in the observation grid was carried out, essentially, using information gathered in teacher interviews and an analysis of the materials, activities and synchronous virtual lessons (which are recorded and put into *Formare*) made available on the *LMS (Learning Management System)* platform by the seven teachers interviewed.

III. PRESENTATION OF RESULTS

A. Origin of the Project

The data gathered in the interview (E1) allows us to see that the primary constraints are the geographical and demographic nature of the archipelago, which led the RDEC to reflect on the problems and how to overcome them. The constraints identified were:

- Geographical discontinuity and the asymmetry of the populations of the nine islands;
- The villages on the majority of the islands are widely dispersed [1] and, in many cases, are not served by public transport at night;
- The target audience for adult education is adults with professional lives and families;

On the less densely populated islands, there is a greatly limited potential audience for attending adult education courses. Three problems arise from this situation:

- Limited educational offering. The RDEC would have to oblige students to choose certain courses and subjects in order to have sufficient students to constitute a face-to-face group;
- The pedagogical quality would be affected, as discussion and the collaborative work would be greatly limited due to the limited number of pupils;
- From a financial point of view, this situation would be unsustainable because of the considerable human resources (teachers and employees) and service expenses that would be necessary to provide a service to very small groups.



Figure 1. Areas of e-learning proposed by INOFOR (2002)

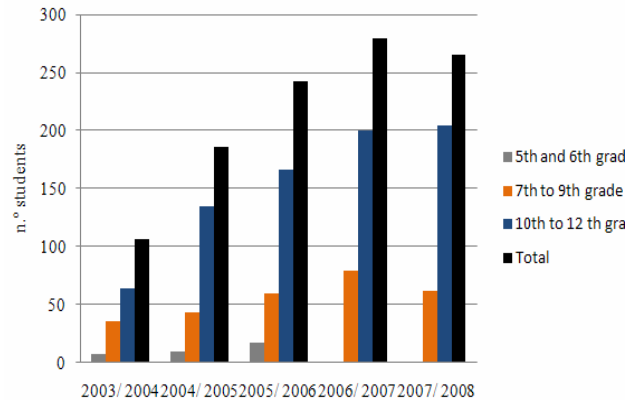


Figure 2. The number of pupils enrolled in adult education mediated through the Internet in Azores

As could be established through the interview data (E1), mediated adult education was a project designed and developed from scratch by the RDEC, resulting from internal reflection and not based on any domestic or foreign model. Indeed, at the level of the 2nd and 3rd years and secondary education, it is a pioneering project at a national level.

B. Implementation of the project

The interview (E1) allowed us to understand the way in which the e-learning project was implemented. Initially, the RDEC launched a call for schools in the Region to apply. The cumulative fulfilment of the following requirements was demanded of applicant schools: availability of boards to offer and maintain courses in operation for at least 5 years; to have teaching personnel, preferably on their own staff, with the necessary skills, and have teaching and non-teaching staff with the necessary proficiency in matters of telecommunications and information technology, or a consultancy that could fulfil these requirements.

The diagram in Fig. 2 shows a gradual increase in the number of pupils enrolled. In the 2003-2004 school cycle, when the project began, a total of 106 pupils enrolled. Enrolment has gradually increased over the past few years. The highest enrolment was in the 2006-2007 school cycle when 279 pupils enrolled. There was only a slight decrease in the 2007-2008 school cycle when the enrolment dropped to 265 pupils. This fall the number of students enrolled has remained much the same, which may be a sign that the system is serving almost all of the present demand.

It was not possible to accurately establish the area of residence of these students because of an absence of data. Nevertheless, analysis of the enrolment in the different subjects allowed us to ascertain that the number of students outside the ARA is small. As well as a lack of awareness of e-learning outside of the region, perhaps one of the reasons for the limited number of students outside the ARA may also be the prices charged, which are ten times higher for pupils outside the region.

C. Method of operationalising adult education mediated through the Internet

The school, EB 3/S Vitorino Nemésio is responsible for the pupils' entire schooling process from registration to graduation. Local schools offer support in the students' area of residence primarily with regards to logistics, offering teacher service for monitoring face-to-face written tests and the constitution of a judging panel for face-to-face oral tests.

For each subject, there is one synchronous session per week with a duration of two hours. The synchronous virtual lessons are taught through the EB 3/S Vitorino Nemésio's electronic office, a room equipped with around a dozen computers where teachers and pupils interact in a chat environment. Teachers may opt to teach from home with board authorisation. The Formare platform from PT Inovação (a portuguese enterprise - Portugal Telecom Innovation) serves as support for the process of teaching and learning (Fig. 3).

Although this platform provides audio synchronisation, the teachers we interviewed stated that they do not use it and asserted that they were not aware of any teacher that did so regularly. The innumerable technical problems presented by the audio made normal use impossible, the drawbacks thus proved greater than the advantages.

Collaborative relationships between the coordinator of e-learning and the teachers are favoured by the coordinator's practical experience as a teacher that uses the e-learning system. As a result, the coordinator is better able to maintain permanent contact with the system and with the other teachers, more easily resolving problems that arise.

D. Development of the teaching and learning process

The persons participating in the teaching/learning process also essentially work on an individual basis in accordance with the face-to-face teaching model. In the development of the teaching/learning process, there is a remarkable transposition of content, as well as face-to-face teaching methodologies to e-learning. At the level of content, a great predominance of *Office* tools was witnessed, with *Word* standing out (representing 71% of all the files made available on the platform), followed by *PowerPoint* (10%).

Regarding methodology, a transposition of the activities and strategies of face-to-face teaching to e-learning is also evident. None of the teachers that taught in e-learning had any prior experience as a tutor or student in *e-learning*. Participation in training courses specifically designed for *e-learning* was also absent.

The development of the process of teaching and learning in e-learning does not sharing or collaborative relationships. Virtual lessons have an expositive nature, with teachers taking on a very central role. In the interviews conducted (E3), all of the teachers indicated pupil - pupil interaction as a less valued factor in the teaching/learning process. The options of organizing group work, discussion forums and authoring tools are examples of the functionality offered by *Formare* that enhance collaborative study, and of which there was no visible use.

The creation of materials was never carried out collaboratively between the teachers. Informally, and occasion-

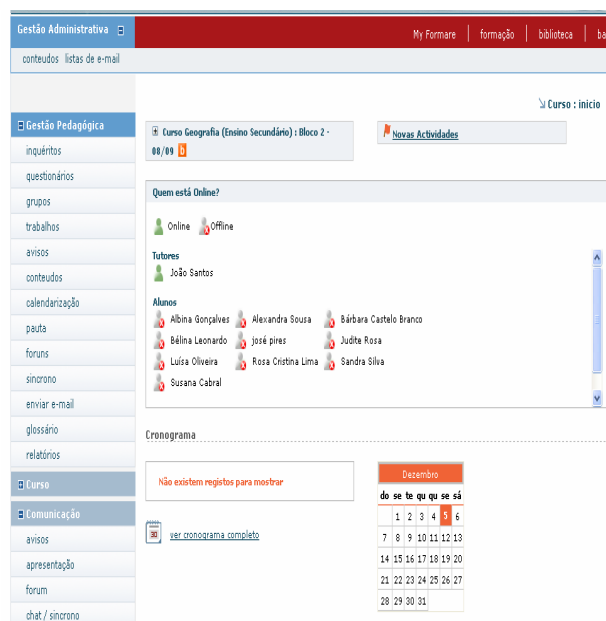


Figure 3. Overview of *Formare* from the teacher's viewpoint

ally, there were exchanges of teaching materials and mutual help with problem solving.

E. Assessment of the teaching and learning process

Legislation [11], which provides the legal framework for the rules of assessment, states: "*The assessment is continuous, elements of multimedia assessment coexisting with moments of face-to-face assessment.*" EB 3/S Vitorino Nemésio's pedagogical board determined an 80% weighting for the face-to-face assessments. Face-to-face assessments always involve administering two or three tests (written assessment forms), according to the duration of the module. The tests are devised and corrected by the subject's teacher at the EB 3/S Vitorino Nemésio. The results are sent to the school in the student's area of residence by email, and the tests are sent for correction to the EB 3/S Vitorino Nemésio by post. In the foreign language subject modules, the 80% weighting of the face-to-face assessments is divided into the written test (70%) and the oral test (30%). The oral tests are taken at the school in the student's area of residence before a judging panel of teachers of that school, but in accordance with a matrix drawn up by the teacher at EB 3/S Vitorino Nemésio. The test judging panel marks and sends a descriptive report to the principal teacher on Terceira Island.

F. Pupils academic results

In relation to the results, Table 1 shows that for the two academic years for which data exists (2005/2006 and 2006/2007), the percentage of passes was 45.5%, failure translating into, in the first place, abandonments, 29.3%, and failures, 25.2% (Table I).

As regards secondary education, the EB 3/S Vitorino Nemésio made data available to us about passes, abandonments and failure from when the e-learning began (2003/ 2004 to 2006/ 2007). The percentage of passes was very similar to that of elementary education, in the mean of the 4 years being 49% (Table II).

In summary, failure in mediated adult education translates more into abandonment of the system than into fails.

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TABLE I.
PASSES, FAILS AND ABANDONMENTS IN THE 7TH TO 9TH OF
ELEMENTARY EDUCATION, ACADEMIC YEARS 2005/ 2006
AND 2006/ 2007

Academic year	Absolute number				In percent		
	No. pupils	Passes	Fails	Abandonments	No. pupils	Passes	Fails
2005/2006	347	174	82	91	50.1	23.6	26.2
2006/2007	390	161	104	125	41.3	26.7	32.1
Total	737	335	186	216	45.5	25.2	29.3

TABLE II.
PASSES, FAILS AND ABANDONMENTS IN GRADES 10 TO 12 OF
SECONDARY EDUCATION, ACADEMIC YEARS 2003/ 2004 AND
2006/ 2007

Academic year	Absolute number				In percent		
	No. pupils	Passes	Fails	Abandonments	No. pupils	Passes	Fails
2003/2004	317	171	26	120	53.9	8.2	37.9
2004/2005	444	239	38	167	53.8	8.6	37.6
2005/2006	498	236	81	181	47.4	16.3	36.3
2006/2007	569	249	124	196	43.8	21.8	34.4
Total	1828	895	269	664	49.0	14.7	36.3

G. Future of the project

According to the RDEC (E1), the project is to continue, correcting inefficiencies detected and broadening the scope of training for teaching and non-teaching staff.

IV. DISCUSSION OF RESULTS AND CONCLUSIONS

E-learning allows some of the geographical and demographic barriers that the archipelago faces to be overcome, namely geographical dispersion and the existence of isolated rural areas with very low populations. This system enables us to diversify the delivery of educational services at costs that would make on-site teaching unaffordable. The spatial and temporal flexibility in terms of lesson frequency and the completion of activities offered by the system allows audiences to be provided for that would otherwise be prevented from progressing with their studies.

E-learning may offer other advantages, namely the continuous training of teachers and educational assistants. Currently, the system essentially serves students in the Azores. Broadening to emigrant communities and students outside the region is dependent on wider dissemination and an adjustment in price levels for registration and enrolment. However, it is important to solve some issues related to the quality of the system so it may be improved.

Ramos, Carmo, Fernandes, Leask and Younie (2001) [12] conducted a multiple case study under the scope of the educational use of ICT in Portuguese schools. The

study concluded that the following were factors that facilitated the use of ICT by teachers:

- Training for the acquisition of technical and pedagogical skills;
- Personal motivation in this area
- A spirit open to criticism and innovation
- The presence of teachers for technical support and for dynamising projects
- Relationships and collaborative work habits in different areas
- Knowledge of the *software* and its potential
- Sensitivity of school management to the use of ICT

Bernath and Ruben (2001) [13], basing themselves on the study *Virtual Seminar in Distance Education*, also highlight the importance of training in the acquisition of technical and pedagogical skills. These researchers consider that training with professionals in the field of distance learning is a factor of great importance in the development of quality tutoring. Benneth and Marsh (2002) [14] describe the success of their experiments in training new *online* tutors through the simulation of learning communities. Given that the EB 3/S Vitorino Nemésio does not have a critical mass of professionals with experience in *online* education, providing their teachers the opportunity to attend simulated *online* courses, taught by professionals, would be a fundamental factor in achieving a leap in the quality of e-learning. This training takes on an even greater importance when the teachers do not have any experience as *e-learning* students [9], [13].

Taking the conclusions of the studies of Ramos et al [12] in mind, we thought that the following could be measures to facilitate a more effective use of the ICTs and the quality of teaching materials:

- Provide teachers with training in the pedagogical area of *e-learning* with professionals [14]
- Create working groups during the non-teaching component time for the collaborative creation of multimedia materials;
- Constitute of a team of more experienced teachers to offer support in the technical sphere;
- Develop *coaching* systems

Zimmer, Haris and Muirhead (2000) [15] consider it fundamental to utilise the proper methodological framework in the exercise of successful tutoring. Being a teacher in an *online* environment is not exactly the same as being a classroom teacher. Many institutions consider that an efficient classroom teacher can also teach *online*. Nothing could be more wrong [16]. This false impression is often made in e-learning because, as we have already mentioned, none of the teachers interviewed (E3) possessed a solid training in the field of *e-learning*, nor had experience as a student or tutor in online instruction. The lack of models of the operational dynamics of an online course has resulted in the transposition of methodologies used in face-to-face instruction to mediated instruction. The use of ICTs in education does not necessarily mean greater value, or a break with the educational models of the past [17].

Establishing a common asynchronous means of communication, with defined rules of participation, and collaborative work may promote inclusion, accountability

and the development of a sense of belonging that would probably mitigate abandonment.

Regarding assessment parameters, the elevated weighting of the face-to-face tests in the final grade (80%) is the most relevant factor. According to what we established in the interviews conducted with the teachers (E3), the majority agree that face-to-face assessment must necessarily take on an important weighting as a guarantee of credibility. Lagarto (2005) [18] recognises the importance of this problem, namely when there is a need for certifying training. Nevertheless, he considers that mechanisms may be developed to improve this setback, in order to favour interactivity and collaborative work, including group work, participation in asynchronous discussions and discussion forums or the use of *software* [18]. *E-learning*, beyond cognitive assessment, allows the collaborative work to be assessed. The questions of socialisation, a paradigm of face-to-face systems, also may be circumvented by technology through synchronous communication tools [18]. It is important to rethink the weighting of the face-to-face and distance-learning components, finding a point of balance between the credibility of the training and the adequation of the assessment to the type of activities developed.

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