



Multidisciplinary Experiences at University Degrees in the Use of Synchronous e-Learning

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Abstract

In an increasingly technological milieu, new technologies are appearing and can be integrated into different aspects of education, not only in those subjects strictly related to technology, but also in other settings. In this framework, the Universitat Politècnica de València (UPV) has acquired different e-learning platforms since the early 2000's. Initially, PoliformaT, a Sakai-based platform, was extensively introduced among the lecturers of the UPV. However, despite its suitability for sharing information between lecturers and students, its asynchronous nature prevents an efficient interaction between both, which may difficult the learning process. As an alternative, Poli[ReunióN] (Adobe Connect-based online service), a new synchronous e-learning platform, has been recently introduced in the UPV. Poli[ReunióN] provides virtual sessions chaired by the lecturer and collaborative learning sessions, where interaction between lecturers and students is enabled by means of audio/video-conferences and software application sharing. Thus, Poli[ReunióN] offers the opportunity to plan new educational experiences where technology may help to achieve new learning objectives. Nevertheless, the main concern regarding this tool is the lack of experience of UPV lecturers because of its novelty. To check its usefulness we have performed a multidisciplinary experience involving a wide range of subjects of UPV degrees: Private Telecommunication Systems (degree in Telecommunications Engineer), Algorithms and Data Structure (degree in Computer Sciences), English for Foreign Tourism (degree in Tourism), and Genetics and Plant Breeding (degree in Agriculture Engineer). Pros and cons of the use of Poli[ReunióN] in different learning activities proposed in the mentioned degrees are discussed from both the lecturers and the students' point of view. These experiences may help lecturers and other professionals of education in implementing similar e-learning tools.

1. Introduction

Since the early 2000's, a Sakai-based e-learning platform (*PoliformaT*) is available at the Universitat Politècnica de València (UPV). The framework enables, among other features: i) the provision of learning materials to students, and ii) the assessment of the learning progress achieved by students. *PoliformaT* is mainly used as a common mailbox in which both students and teachers share information [1]. However, due to its asynchronous nature, it is difficult to use it for any activity involving teacher-student interaction, essential in the learning process. For instance, a significant hindering for students in distance learning is the lack of fluent communication and interaction with the teacher or among colleagues. As Warschauer et al. claim with regard to networking and internet, emphasizing the teaching role; "it is the teaching that makes the difference" [2]. In this respect, synchronous e-learning tools can overcome this limitation as they can provide the opportunity of: i) watching the teacher and talk to him/her, ii) sharing documents instantly and iii) following directly what the teacher does in the computer. Therefore, synchronous tools provide experiences similar to regular classes or



meetings, and are useful for tutorships, on-line courses, regular courses (students who cannot physically attend), or seminars provided by foreign colleagues in video-conference format.

All these reasons motivated the recent adoption of a new synchronous e-learning tool named *Poli[ReunióN]* (Adobe Connect-based online service) at the UPV [3]. *Poli[ReunióN]* enriches the existing e-learning UPV system providing virtual classrooms/sessions chaired by the lecturer and collaborative learning sessions [4, 5, 6]. These virtual rooms are accessed by participants (lecturer and students) by the only means of a web browser with Adobe Flash support or via a special application for iPhone/iPad. The participants can then exploit a range of possibilities: i) audio/video-conferences, where participants can discuss in real time using a microphone and a webcam, ii) polls, to achieve immediate feedback, iii) document sharing, to allow remote displays of slides in the student's devices and document distribution, iv) software application sharing, with which participants can broadcast the view of their desktop or an application to other participants' screens, v) group work, for which participants are distributed in different groups and interaction of their members remains within their reference group, while always being able to ask the lecturer for help, vi) web links, where a presenter can remotely open a web browser in another participant's computer pointing to a specific webpage, and vii) chats, to allow synchronous text-based conversation. In addition, it is possible to link a chat session to a question-answer component so that the moderator (creator of the session: lecturer in most cases) of the session can allocate questions to be answered by the rest of participants. However, due to the novelty of this software, its usefulness in the UPV context remains to be proved.

In this respect, our team of Active Methodologies and Information Technologies (MATI), as an educational innovation group of lecturers of the UPV, has carried out a multidisciplinary experience with *Poli[ReunióN]*. MATI members belong to a range of educational disciplines among the UPV degrees: Computer Science, Agronomics, Tourism, and Telecommunications. It is our belief that in an increasingly technological milieu, new technologies can be integrated into different aspects of education, not only in subjects strictly related to technology. This contribution presents the conclusions issued from experiences that have been deployed in different courses at various UPV degrees.

2. Material and methods

The synchronous e-learning experiences with *Poli[ReunióN]* were carried out within the following subjects/degrees: i) Private Telecommunication Systems/Telecommunications Engineer, ii) Algorithms and Data Structure/Computer Sciences, iii) Genetics and Plant Breeding/Agriculture and iv) English for International Tourism/Tourism. To perform these experiences, personal computers or laptops equipped with microphones/headsets are essential for both lecturer and students. The specific procedures of each experience were as follows:

2.1. Private Telecommunication Systems

This subject aims at describing wireless technologies where the teaching methodology is primarily based on master lessons using slide presentations. During the *Poli[ReunióN]* experience, the teacher was the main speaker, although questions were raised by students using the e-learning tool and vice-versa. Two sessions were planned. During the first one, all students remained with the teacher in a classroom equipped with computers and headsets to get familiar with this e-learning tool. This session was assisted by a laboratory technician that helped all students to set all the equipments up. In the second session, part of the students stayed at home following the lesson virtually, while the lecturer was in the classroom with the rest of students as a control population.

2.2. Algorithms and Data Structure

The subject Algorithms and Data Structure involves fundamentals on the Java programming language and management of algorithms and data structures. Practical skills are required to ensure an optimum learning process. In this respect, students are highly motivated when they program in the classroom. In this case, the *Poli[ReunióN]* experience consisted in collaborative programming sessions. First, the lecturer showed a programming code with a range of mistakes (both fundamental and mere typesetting mistakes) through *Poli[ReunióN]*'s functionality of sharing applications. The developing



environment was running on the lecturer's computer and the students could see the display of the program both in their screens and through a projector. Students had to identify the mistakes and ask for the control of the application through the tool in order to correct them. Then, the rest of the students were able to watch the changes made by their mate in two ways: projected directly in the slides screen and in their own laptops.

To encourage students to participate in the trial, it was planned as a contest. Thus, the first student who detected a mistake started to correct the source code. If that student was wrong, another student could ask for permission and take the control. This way, students collaborated to solve problems. To perform this experience, a PC connected to a slides projector (to show the content of the *Poli[ReunióN]* session) and a laptop connected to a wi-fi system, were required. Students joined the session with their own laptops and, even the iPhone (in this case they were unable to exchange contents, and could only receive information). This experience was performed twice and involved a total of 18 students. After the experience, the students were asked to fill an online questionnaire to express their point of view concerning the introduction of such a tool in a learning environment.

2.3. English for International Tourism

The use of *Poli[ReunióN]* in an English learning environment was set with three different objectives: i) it aimed at promoting communication among students and between the students and the teacher, ii) it also intended to test the practicality of allowing students to work listening skills at their own pace, and iii) it proposed an e-learning collaborative activity, to help improve the student maturity and self-confidence [7] as well as student involvement, satisfaction and engagement. An accurate selection of the activities proposed to the students was crucial in the obtainment of the results expected [8], as well as the appropriate size of the classroom participants. The exercises proposed were related to these aims and, once finished the session, students were asked to fill a questionnaire about the quality of the platform, pros, cons, opportunities, most frequent uses, etc. The activity was entirely envisaged as a virtual class. The purpose of it was to bestow students with the appropriate time and means to complete a listening comprehension activity depending on their skills. Then, by means of collaborative work, they could fill any missing information they might have. Firstly, a video was shared with the students so that they could actually watch it and listen to it in their own computers. Then, students had to complete their own listening comprehension questions, offered to them, again, using the sharing tool offered by *Poli[ReunióN]*. Thirdly, they were separated into groups so that they could check and correct their answers. Finally, only one document had to be shared by each group.

2.4. Genetics and Plant Breeding

For the *Poli[ReunióN]* experience in Genetics and Plant Breeding, a total of 40 students were divided into four groups (ten students each) and each group was again subdivided into two groups: a conventional lesson group (session type A) and a *Poli[ReunióN]* lesson group, which followed the lecture in another classroom (session type B: e-learning; Wi-fi connection). This allowed repeating the experience four times. The lesson was chaired by a lecturer present in session A, equipped with a laptop connected to a slides projector and to the *Poli[ReunióN]* platform. In this way, the lecturer could give the lesson simultaneously to both the students present in session type A and those who followed the lesson through *Poli[ReunióN]*. Students in session B were assisted by a second lecturer to solve any problem with the use of the platform. Once the lesson finished, all students were asked to fill-in a test about the topics explained in the lesson evaluated on a 0 to 10 scale and a poll about their experience with the tool.

3. Results and discussion

3.1. Private Telecommunication Systems

The experience, from the teacher point of view, was relatively good. Among positive aspects, teaching using slides can be easily handled using *Poli[ReunióN]* platform. Slides are uploaded in pdf format and



the application offers tools to point the slide and highlight items. Management of students' questions is also intuitive as they can raise their hands easily through the participants list (a kind of chat list). It is also straightforward for the teacher to answer or make questions. As negative aspects, we realized that students had several connectivity problems (mainly at home due to the weakness of wireless signals) and some students had troubles configuring their microphones, being only able to hear the lessons. The configuration problems were partially solved in the first session with the help of the laboratory assistant and the lecturers. However, connectivity problems were difficult to solve making sometimes communication impossible. The second main problem was the lack of visual contact with students, which did not allow the teacher to identify their degree of understanding and motivation. The experience was exciting for students as it allowed breaking the routine and using technological tools that they tend to prefer. The second session was especially appreciated, because they could follow the lessons at home, without going to the University. For them, the connectivity issues were not a problem, except when their microphone was unavailable. In fact, the final poll (Table 1) shows that they actually consider e-learning as a possible candidate to substitute face-to-face classes.

3.2. Algorithms and Data Structure

As a whole, the experience was well received by the students. The main advantages of *Polij[ReunióN]* found in this experience were: i) to encourage students taking part in classroom activities as they use the same programming environment, ii) to develop their practical skills as they have to revise and correct a real programming code by themselves, iii) to simultaneously encourage their competitive spirit and team work. In the final poll, 87% students considered useful this e-learning platform (>5.0 points on a 0 to 10 scale). Nevertheless, about 50% experienced, at least, one disconnection during the experience and 28% experienced >5. Thus, the main problem detected was the frequent disconnections experienced during the virtual session, which avoid a fluent learning process, forcing the students to connect several times within a session. Fortunately, the deployment of the 8.0 version of Adobe Connect should alleviate this problem in the future.

Table 1. Results of the students' opinion poll.

Which is your overall assessment of the experience?	
Very positive	57%
Positive	14%
Regular	14%
Not very good	14%
Awful	0%
Would you be willing to use this tool for a full course?	
Yes, it would avoid going to the class.	57%
Yes, I like new technologies.	29%
Not, I prefer the contact with the teacher	14%
Not at all, the application is terrible	0%
Would you use e-learning for your education?	
Yes, my learning could be improved.	86%
Not, I prefer face-to-face teaching	14%

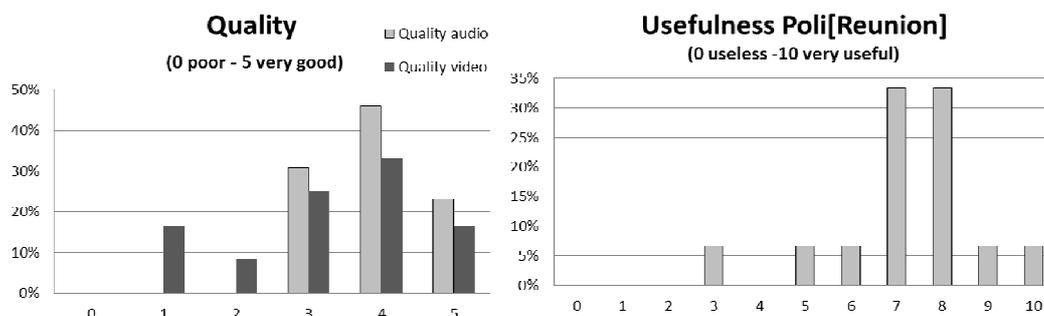
3.3. English for International Tourism

The degree of success in this exercise varied. Chat rooms established for discussion were very well accepted and profitable among students. However, there were some difficulties in using the platform for the listening activities, since not all audio and video formats are accepted for work and sharing. Additionally, students expressed satisfaction in the possibility of working collaboratively in a networked environment. The communication quality through the tool was good in general (Fig 1) and the degree of satisfaction was high. The platform seems to be reliable and well accepted for written and one-to-one oral activities as well as for sharing of simple documents, but not for showing/sharing heavy texts, or texts with embedded images, since some students encountered problems with the video shared.



Again, the results show that students considered the tool an option, but not yet ready to substitute totally the classroom activity. Despite the experience was based on a 15 students population, we consider that the appropriate size for this kind of e-learning sessions should be 10 students.

Figure 1. Results of questionnaire of Poli[Reuni3n] trial in English for International Tourism.



3.4. Genetics and Plant Breeding

The experience with students from Agriculture degree was also fruitful. As the other experiences, we found some problems of Wi-fi connections. Despite these problems, students enjoyed a lot the experience, and the usefulness of this e-learning tool was confirmed with the results of the tests. There were no significant differences in the results of the test between conventional and the *Poli[Reuni3n]* lesson (Table 2). Therefore, we can conclude that the learning process was similar in both ways and this e-learning platform can be considered as a real alternative to conventional lessons.

Table 2. Results of the test (0-10 scale, mean±SE) made by students of Genetics and Plant Breeding.

Session	Conventional lesson	e-learning lesson
S1	7.40±0.51	7.18±0.36
S2	7.35±0.86	7.00±0.91
S3	8.20±0.61	8.18±0.26
S4	7.50±0.55	7.19±0.40
Total	7.60±0.30	7.35±0.29

4. Conclusions

Poli[Reuni3n] is a useful tool for distance e-learning, mainly because of: i) its synchronous nature, allowing to answer the students' questions during the session and ii) the possibility of cooperative work among students and iii) its versatility, allowing different types of activities (writing, taking the control of someone else's computer, listening, chatting...). *Poli[Reuni3n]* was highly appreciated by the students, however the teachers found several disadvantages, especially those regarding the connectivity problems that may be solved in the new Adobe Connect version (8.0). Other important issues may be taken into account before using this tool. First, a high knowledge of *Poli[Reuni3n]* is required to manage a dynamic virtual sessions with a large number of students. This involves a previous training for both the teacher and the students before using the system. Therefore, some tutorials and a demo session must be planned in advance to check the viability of the computers and to get familiar with the functionality of the tool. Another problem was the lack of visual contact with the audience which difficult the teacher-student interaction. This latter problem can be solved using the videoconference mode, but it is useful just with a limited number of students due to the connectivity problems. As a conclusion, *Poli[Reuni3n]* is at the moment a useful tool for distance learning, very appreciated by the students, but it is still far from substitute a conventional *in situ* lesson.



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