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E-learning for the environment

The Universidade Aberta (Portuguese Open Distance University) experience in the environmental sciences post-graduate courses

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Abstract

Purpose – In recent decades, there has been an increase of public awareness about environmental problems. A simultaneous effort to increase educational course offerings in this area has been made. The purpose of this paper is to evaluate the first edition of the blended learning MSc in Environmental Citizenship and Participation that is offered by Universidade Aberta, Lisbon, Portugal. This is the first and only MSc offered in the distance learning mode in Portugal in this scientific area. The Master's programme includes environmental and social sciences contents. Also the programme includes tools and methodologies designed to help the students put into practice their expanded awareness, and knowledge within educational and public participation processes, within environment projects, programs or plans.

Design/methodology/approach – Evaluation is performed with the students using three data sources: a questionnaire survey, personal interviews and assessment materials produced by the students. These data are designed to evaluate course performance in terms of: student motivation, student-content interaction, student-student interaction, student-teacher interaction, learning activities, type of evaluation, and student's environmental citizenship attitudes and behaviours.

Findings – The qualitative analysis indicates a very high level of student motivation and satisfaction with the programme. The course contents, organisation and learning regime allow students to change their attitudes about environmental domains and to feel they will contribute to others change of attitudes and behaviours.

Originality/value – E-learning brings new dimensions (to traditional education when it comes to adult learning) and increases the motivation to learn about environmental issues (if the e-learning for environment course allows for new ways of exploring and solving environmental problems in an interactive way). Moreover, it may increase the readiness to learn if the students are allowed to move into new social roles through the course.

Keywords Postgraduates, E-learning, Environmental studies, Learning, Distance learning, Portugal

Paper type Case study

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1. Introduction

The role of environmental education is to support changes in behaviour, values, management and policies towards more sustainable production and consumption patterns (Eneroth, 2000). E-learning has a role to play in this endeavour, as it allows global access to environmental education, independent of time and place, once the courses are available on the internet (Eneroth, 2000; Garrison, 2000). Using this new communication medium is one way of fulfilling the objective (36.4b) outlined in Agenda 21 (UNCED, 1992):

> [...] to achieve environmental and development awareness in all sectors of society on a worldwide scale as soon as possible.

Additionally, e-learning has the potential of reducing the environmental impacts from face-to-face education (potential resource savings can be found in the use of time, space heating and ventilation, transportation, paper and generation of wastes). The achievement of a sustainable society is ultimately an educational enterprise. E-learning has a role to play in this endeavour, as it permits global access to environmental education, independent of time and space (Eneroth, 2000).

Research has strong evidence for the effectiveness of distance learning *per se* as a method of delivery (Moore and Thompson, 1997). In distance learning programmes, objectives and learning outcomes should be the driving forces (Tham and Werner, 2005), and the effectiveness of measure becomes "how much and how well is this being absorbed?" (Kirkpatrick, 1996). When designing and evaluating e-learning in higher education essential aspects to take into account are the fact that distance learners are dynamic individuals that often change in response to both educational and life experiences (Gibson, 1992), and that distance learners are a diverse group (Holmberg, 1995; Altbach, 2000) with different learning styles (Billings, 1993).

The essence of quality education, in any form, is to ensure that learning objectives are achieved efficiently and effectively, without sacrificing the standards of the educator and his or her institution (Tham and Werner, 2005). Therefore, the evaluation process seeks to confirm whether the learning objectives and outcomes have been implemented and achieved effectively (Rae, 1999). These critical components and competencies that educational institutions should provide students in order for them to be better able to face society were mentioned in by Gardiner (1994). The potential for successful learning and transfer from online education is evident (Arbaugh, 2000a, b; Schramm *et al.*, 2001, 2004).

Environmental sciences is an area which has received a growing interest by the working-student population seeking professional development in this field, and who have no available time or a university nearby to attend to a face-to-face courses.

Online education in the environmental sciences can be a complicated issue due to the usual need of complementing laboratory practical sessions and face-to-face fieldtrip activities. However, up to date simulations, videos and other information and communication technologies, or intensive face-to-face activities given, in a short period of time, allow for the existence of these courses.

This paper is designed to present and evaluate the first edition of the blended learning (b-learning) MSc programme in Environmental Citizenship and Participation. Evaluation was carried out with the students using four data sources: two questionnaire surveys applied in two distinct moments during the, a personal interviews and assessment

materials produced by the students. These data were designed to evaluate course performance in terms of:

- student motivation;
- student-content interaction;
- student-student interaction;
- student-teacher interaction;
- learning activities;
- type of evaluation; and
- student environmental citizenship attitudes and behaviours.

The MSc programme in Environmental Citizenship and Participation

Universidade Aberta (UAb) is a public distance teaching university, founded in 1988, with the mission of training large and geographically disperse publics, given a new opportunity to anyone that are not able to complete higher education studies at the appropriate time. At the same time, the University also has preoccupations with the requalification. At the moment we have around 10,000 students in Portugal and in the Portuguese speaking countries, such as Angola, Brazil, Timor, Mozambique, Cabo Verde, etc. and around 200 teachers. The University headquarters is located in Lisbon, but there are delegations in Coimbra and Oporto and also a network of centres distributed by the country. In the year 2008/2009, 2,220 new students enrolled in the university first and second cycle (MSc programmes) programmes offered at the UAb. From these, 145 enrolled in the first year of the first cycle on environmental sciences.

The MSc in Environmental Citizenship and Participation offered at the UAb (Portugal) was initiated in the year 2006-2007. It is a formal course, organized according to the European credit transfer and accumulation system (ECTS), and taught in b-learning system. Most of the curricular units (CUs) were delivered via e-learning except for three CUs that were taught in face-to-face lectures concentrated on Saturdays. These three CUs were taught by invited experts from other institutions, experts on their field. The minimum and maximum number of students was fixed, respectively, on eight and 30. The MSc has the duration of three semesters, the first two semesters dedicated to the CUs (60 ECTS) (Table I) and the third semester is dedicated to planning, developing, writing and defending of the thesis (40 ECTS). The semester is defined as a period of 20 weeks, the five final weeks being dedicated to the final evaluation. The open source Moodle (www.moodle.univ-ab.pt/moodle) software was used as the course management system (CMS) used in this MSc.

This programme is designed to prepare students for working on environmental policy making as well as in improving their environmental citizenship, participation and planning abilities. The programme is designed to help governmental workers, public and private environmental advisors, members of environmental non-governmental organisations, teachers, researchers and individuals involved in environmental practices, policies, planning, teaching, participation and citizenship. Subjects, methodologies and the case studies are drawn from the environmental sciences, sustainability and social sciences.

The MSc in Environmental Citizenship and Participation is the first and only MSc offered in the distance learning mode, in Portugal, in this scientific area. The Open

	ECTS
First semester – fundamentals (*select 30 ECTS*)	
Opcional CUs	
Land use management	5
Pollution and resources	5
Waste management	5
Instruments for support of environmental management	5
Biodiversity, geodiversity and conservation	5
Alimentary consumption and environment	5
Elements for the analysis of the social conjuncture[a]	10
Second semester – conceptual, practical methodologies and techniques (*30 ECTS*)	
Obligatory CUs	
Ethics and environmental citizenship	5
Sustainability politics[a]	5
Participation and interactive methods in environmental decision making[a]	4
Methodologies of social intervention	8
Methodology of applied investigation	3
Projects and methodology in environmental citizenship	5

Note: [a]CUs taught in face-to-face lectures

Table I.
The curricular plan of the MSc in environmental citizenship and participation offered at the UAb, Portugal

University of the UK offers two similar Master's programmes: the MA in Environment, Policy and Society www.open.ac.uk/courses/bin/p12.dll?Q01F19) and the MSc in environmental decision making (www.open.ac.uk/courses/bin/p12.dll?Q01F13). The MA introduces the student to the responses of social science approaches to environmental issues. In this MA students work with tools, theories and models and consider critically how the social sciences have responded to complex and uncertain environmental changes. The core taught courses focus on ecological thinking, the economic aspects of environmental policy, environmental conflict resolution and international environmental negotiations. The environmental decision making MSc programme was established to meet the challenges of environmental decision making in the context of sustainable development. It was designed to meet the needs of specialists, managers and the public for postgraduate level environmental education to encompass the complexities of these challenges. Everyday concerns of environmental protection, natural resource management and waste disposal, and rapidly changing environmental legislation and policy are considered in global and local contexts. The courses teach the skills needed to unpack the issues, introduce environmental management systems and to participate creatively in the process of making environmental decisions, in all sectors of society. In the Bologna context, we can state that the UAb MSc is similar to others distance learning courses in the subjects and knowledge, objectives and competences, cognitive, practical and professional skills that are to be obtained by the students in the process of the programme. The Bologna action scheme for the mobility of university students is guaranteed.

In the first edition of this programme only eight students were enrolled, but on the following two years more then 20 students have enrolled the MSc. The students who finished the first year curricular programme were very satisfied with the contents, organization and teachers performance. The students of previous years give always a good opinion of the programme to the new students.

2. Methodology and research instruments

The study case, herein presented, was carried out to evaluate the satisfaction level and difficulties felt by students, between June 2007 and January 2008, during the first edition of the b-learning MSc in Environmental Citizenship and Participation from UAb.

In methodological terms, two confidential questionnaire surveys, semi-structured personal interviews and observation grids were used to obtain a diversified set of data that were analysed using a triangulation strategy.

The first confidential questionnaire survey was comprised of 25 questions, designed according to appropriate questionnaire criteria of clarity and objectivity (Quivy and Campenhoudt, 2003), to characterise the individuals:

- in terms of sex, age, reasons for enrolment in this course and internet usage habits;
- from their views about e-learning potential; and
- from their level of satisfaction with the programme (Table II).

The questionnaire was applied to two convenience sub-samples, selected to typify diverse populations of students, six months after the beginning of the post graduation course. Groups A and B comprised, respectively, of four students who completed the course and four students who quit the course, 2-4 months after its beginning.

The second confidential questionnaire survey was only applied to Group A at the end of the second semester and was composed of 29 questions using the criteria of clarity and objectivity. It was subdivided in four sections, aiming to evaluate:

(1) student's knowledge acquisition related with the specific environmental areas (water, waste, land use, air, natural conservation, soil and products sustainable consumption);

(2) changing attitudes towards the previous specific environmental areas;

(3) changing behaviours related with the previous specific environmental areas; and

(4) how they will use the acquired knowledge for themselves and others.

Semi-structured interviews were carried out with students of Group A to clarify trends and issues that were brought up by the questionnaire survey and to characterise main weaknesses and strengths of the course.

The observation grid was prepared to characterise the virtual classes of the MSc/programme in Environmental Citizenship and Participation according to their

Table II.
Objectives of the first questionnaire survey

Sections of the questionnaire	Objectives
I	Characterisation of students (sex, age, identification of internet usage habits and identification of reasons for course enrolment)
II	Characterisation of the student's opinion about the learning on on-line context
III	Characterisation of the student's evaluation of the course (organization, pedagogical resources, qualification and motivation by the teachers)

content organisation, pedagogical instruments, learning activities (e-activities), synchronous/asynchronous communication, support materials and assessment.

3. Results

3.1 First questionnaire survey

Group A was comprised of one female and three male students, with age ranging from "less than 30 years old" to "more than 50 years old", and Group B was comprised of two female and two male students, with ages ranging from "from 30 to 40 years old" to "more than 50 years old" (Table III).

The main reason for enrolment in the course was the student's interest/need in the study area, for both groups (Table III). The data suggested that online methodology and flexibility was not the main reason for the student's choice of this course.

Patterns of internet usage with this course were very different for the two groups, indicating a much more regular and assiduous participation in students of Group A than in students of Group B (Table III). Interestingly, only students from Group B had previous online learning experience.

Data presented in Table IV indicate that students from Group A and B had different opinions about learning online processes. Group A, in general terms, were more open and gave more importance to a successful learning outcome, with good student-student interaction, and believed more strongly that they could be correctly evaluated in an online learning context, than the students from Group B.

In global terms, students from Group A considered didactic materials and e-activities of high quality, while students from Group B had a lower opinion of the same learning resources (Table V). Students from both groups were interviewed about

Characterising variable	Group A	Group B
Sex	1 F; 3 M	2 F; 2 M
Age	1 " $<$ 30"; 2 "30-40"; 1 " $>$ 50"	2 "30-40"; 1 "40-50"; 1 " $>$ 50"
Reason for enrolment in the course		
Career progression	–	–
Need further knowledge in area of study	–	1
Interest in area of study	4	2
Online methodology/flexibility	2	–
Other	–	1
Internet usage habitats		
Previous experience with e-learning courses	4 "none"	1 "more than 3 courses" 1 "one course" 2 "none"
Frequency of internet usage in activities of this course/week	4 "daily"	1 "daily" 2 "twice" 1 did not answer
Total time (hours) of internet usage in activities of this course/week	1 "7 to 14 h" 1 "14 to 20 h" 2 "more than 20 h"	1 "up to 2 h" 1 "2 to 7" 1 "7 to 14 h"

Table III. Characterisation of students

Statement	Group A	Group B
An on-line course can produce good learning outcomes, but I would prefer enrolling a face-to-face course	1 "partly agree" 1 "does not agree nor disagree" 2 "disagree totally"	1 "agree totally" 2 "partly agree" 1 "does not agree nor disagree"
ICT can substitute successfully the absence of face-to-face contact	1 "agree totally" 2 "partly agree" 1 "disagree totally"	2 "partly agree" 1 "does not agree nor disagree" 1 "disagree totally"
I believe my competences can be correctly assessed in an on-line learning course	2 "agree totally" 2 "partly agree"	1 "partly agree" 2 "does not agree nor disagree" 1 "disagree totally"
On-line does not favour the establishment of personal relationships	2 "partly agree" 2 "disagree totally"	1 "agree totally" 3 "partly agree"
Student-student interaction is an important factor in the learning process in on-line context	4 "agree totally"	1 "disagree partly" 1 "does not agree nor disagree" 1 "disagree totally"
Teachers role in undermined in on-line learning	1 "partly agree" 1 "disagree partly" 2 "disagree totally"	3 "agree totally" 1 "partly agree"
In on-line learning courses, technological issues are more important than pedagogical issues	2 "agree totally" 1 "partly agree" 1 "does not agree nor disagree"	2 "agree totally" 1 "partly agree" 1 "disagree partly"

Table IV.
Characterisation of student's opinion about learning in on-line context

Characterising variable	Group A	Group B
Didactic materials	1 "very good" 3 "good"	1 "good" 1 "satisfactory" 1 "unsatisfactory" 1 did not respond
Contribution of e-activities to successful learning outcome	2 "very good" 2 "good"	1 "good" 1 "satisfactory" 1 "unsatisfactory" 1 did not respond
Teachers		
Scientific qualification	3 "very good" 1 "good"	1 "very good" 1 "good" 2 did not respond
Motivating skills	2 "very good" 2 "good"	1 "very good" 1 "very good" 2 did not respond

Table V.
Evaluation of the MSc programme by the students

the learning resources used in the CUs of the course, and gave greater value to the teacher's support materials (texts), scientific papers, and internet links, than to Power Point presentations and Moodle's lessons. This was further investigated in the personal interviews and observation grids prepared for the CUs.

3.2 Second questionnaire survey

Data presented in Table VI indicate that all students felt they had acquired knowledge in all the environmental subjects. All considered that they had changed their attitudes and behaviours in terms of water, waste, nature conservation and products sustainable consumption. In the remaining subjects (land use, soils and air), the students considered that their contribution might not be enough. A possible explanation could be due to the greater difficulty of a single and urban individual to contribute to environmental changes in these areas. Special care must be taken about behaviour changes because they can only be evaluated at long and not short-terms.

At the completion of the curricular programme, all the students intended to change other's attitudes and behaviours (Table VII). Most of them felt that they had improved their job skills. Also, all the students felt that they acquired an active environmental citizenship, improved their competencies of environmental sustainability and learned novel environmental problems. All the students intended to get involved in environmental public participation processes, although they currently did not participate in any. The public is unaware of the importance of public participation and feel that their opinion is only asked when the projects or plans have been already decided.

3.3 Observation grid for characterisation of CUs

As in face-to-face lectures where the classroom is a privileged space to detect a series of attitudes and problems, the virtual classroom – the site of the CU in a CMS – as an online learning context, may serve a similar purpose or function. Therefore, and in accord with some questions that rose from the analysis of the questionnaire surveys, an observation grid was prepared to characterise the organisation and functioning of the CUs in the platform.

Statement	Section I knowledge	Section II attitudes	Section III behaviour
Water saving and sustainable use	2 "agree totally" 2 "partly agree"	3 "agree totally" 1 "partly agree"	4 "agree totally"
Waste sustainable management	3 "agree totally" 1 "partly agree"	3 "agree totally" 1 "partly agree"	3 "agree totally" 1 "partly agree"
Land use management	2 "agree totally" 2 "partly agree"	1"agree totally" 1 "partly agree" 2 "does not agree nor disagree"	2 "partly agree" 2 "does not agree nor disagree"
Air quality	1 "agree totally" 3 "partly agree"	3 "partly agree" 1 "does not agree nor disagree"	1 "agree totally" 1 "partly agree" 2 "does not agree nor disagree"
Soil management and conservation	1 "agree totally" 3 "partly agree"	2"agree totally" 1 "partly agree" 1 "does not agree nor disagree"	1 "agree totally" 2 "partly agree" 1 "does not agree nor disagree"
Nature conservation	3 "agree totally" 1 "partly agree"	3"agree totally" 1 "partly agree"	4 "agree totally"
Products sustainable consumption	4 "agree totally"	4 "agree totally"	4 "agree totally"

Table VI.
Evaluation of acquisition of environmental knowledge, attitudes and behaviour by the students

Statement	Section IV
Intention to help effect environmental attitudes changes of others	4 "agree totally"
Intention to help effect environmental behavioural changes of others	4 "agree totally"
Improve individual's job skills	2 "agree totally" 1 "partly agree" 1 "does not agree nor disagree"
Allow students acquisition of active environmental citizenship experiences	4 "agree totally"
Improve students environmental sustainability performance	3 "agree totally" 1 "partly agree"
Learn about new environmental problems	3 "agree totally" 1 "partly agree"
Intention of students to be involved in environmental public participation processes	4 "agree totally"
Involvement of students in environmental public participation processes	1 "partly agree" 1 "does not agree nor disagree" 1 "partly disagree" 1 "disagree totally"

Table VII.
Student's opinion of future use of the acquired environmental knowledge

The CUs of the first semester were organised into topics, each topic being developed for periods of one to three weeks, depending on the subject area (Table VIII). The Moodle activities used included lessons, mini-tests, glossaries, discussion fora and blogs. Each topic was generally associated to one learning activity. E-activities used were discussion fora (mostly involving group work), short written assessments and blogs. Communication was mostly asynchronous. Synchronous moments were used to evaluate the learning progress, and for students clear any doubts (content-linked and others) they had. One asynchronous session was used for evaluation. Support materials included books, e-books, research papers, internet sites. Power point presentations and short films were used, respectively, in two and one CUs.

3.4 Personal interviews

The interviews were performed two weeks before the end of the course with students from Group A. This allowed the educators to follow the learning process and gave valuable information. All students rated the course quality as "very high", they identified some of strong points such as the "high communication level", the "depth of coverage of the subjects under studied" and the effectivity of the "e-learning process". Most students agreed that the studied subjects were strongly aligned/connected to fulfilment of the objectives of the MSc. Student-to-student interaction were considered to be "fundamental", both because "it was a part of the asynchronous learning process and also for the support given when times were harder". One student referred the importance of the "occasional classes face-to-face to enforce the friendship and inter-aid spirit". Student-to-teacher interaction was also considered "fundamental", sometimes causing a "solitude feeling if teachers were not online or absent for too long", and at some point a "companionship felling, where distance between students and teachers had disappeared, which contributed enormously to the learning progression". The opinion of the students about the assessment methodologies was also investigated.

	Content organization	Pedagogical instruments (Moodle's)	E-activities	Synchronous/asynchronous communication	Support materials	Assessment
Land use management	Topics 1-3 weeks/ topic 1 activity/ topic	Discussion fora Lessons Mini-tests	Regular activities: Discussion fora Short written assessments Feedback to students	Mostly asynchronous fora 1 forum/activity (generally) 3 synchronous moments	Books Research papers Other word documents internet sites	50 per cent final 50 per cent continuous
Pollution and resources	Topics 1-2 weeks/ topic 1 activity/ topic	Lessons Mini-tests Discussion fora	Regular activities: Discussion fora Topic research Work in group	Mostly asynchronous fora 4 synchronous moments	Research papers Power point presentations Other word documents	30 per cent final 70 per cent continuous
Waste management	topics 1-2 weeks/ topic 1 activity/ topic	Lessons Mini-tests Discussion fora	Regular activities: Discussion fora Topic research Work in small groups	Mostly asynchronous fora 4 synchronous moments	Power point presentations Short films	30 per cent final 70 per cent continuous
Biodiversity, geodiversity and conservation	1-2 weeks/ topic 1 activity/ topic	Mini-tests Glossary Discussion fora Blog	Regular activities: Discussion fora Work in small groups Blog Short written assessments	Mostly asynchronous fora 4 synchronous moments, one of which was used for evaluation	Books/e-books Power point presentations internet sites Other word documents	30 per cent final 70 per cent continuous
Alimentary consumption and environment	Topics 1 activity/ topic	Discussion fora	Regular activities: Short written assessments Discussion fora		Documents obtained via the internet	30 per cent final 70 per cent continuous

Table VIII.
Characterisation of the e-learning CUs of the first semester

All students were more favourable to the ongoing assessment in comparison with only final assessment. Students also agreed that the diversity of e-activities offered in the CU's of the course, for continuous assessment, developed the competences required in each of the scientific areas. Students from Group A were also unanimous that they would easily enrol another course in e-learning, even being aware of the hard work involved in this type of learning process. They had a strong intention and motivation to help change others attitudes and behaviours about environmental issues.

4. Discussion

A number of driving forces are pushing for change in higher education, such as new information and communication technology (ICT), demand for new competencies, flexibility, increased competition and life-long learning. E-learning is both a result of and a response to these changes. In practice, improved infrastructure for "digital highways" and increased computer literacy among the users paves the way for e-learning. This third generation distance education is considered as highly interactive (Eneroth, 2000).

E-learning increases the motivation to learn about environmental issues if the e-learning for environment course allows for new ways of exploring and solving environmental problems in an interactive way (Eneroth, 2000). Besides, the fundamentals of collaborative and cooperative learning, problem-based learning (PBL) is another constructive process that promotes understanding of social and contextual factors (Tham and Werner, 2005).

This study indicated differences between the two groups of students analysed, the first one being a more open attitude and greater curiosity about the online methodology (even before enrolment and not having had previous e-learning experiences) in individuals of Group A than in individuals of Group B. Also, during the course, internet usage habits differed between the two groups, students from Group A were much more regular and participated more assiduously than students of Group B. Thirdly, students from Group A gave more credit to a successful e-learning experience. They gave greater importance to student-to-student interaction and to student-teacher interaction in the e-learning process, and also trusting accurate assessments, than students from Group B. The trends that characterised each group of students were consenting with the observed quitting situation in students of Group B.

The study from Davies and Graff (2005) examined the frequency of online interaction of 122 undergraduates and compared this with their grades at the end of the year. The findings revealed that greater online interaction did not lead to significantly higher performance for students achieving passing grades (however, students who failed in their courses tended to interact less frequently).

Some pedagogical aspects, specifically didactic materials, e-activities and course organization were highly rated. The teacher's motivating role was mentioned by one student from Group A as a "fundamental pedagogical factor which, in some occasions, could have been more positive". Analysing as a whole, the main reason for quitting the course appeared to be related to lack of ICT skills and to difficulties in dealing with ICT-based learning. The personal interviews reinforced this idea, indicating a generalised increase in the satisfaction level toward the end of the course among students who completed it. One student pointed out that "initial technical difficulties and solitude were both later overcome". However, other reasons besides ICT-related

difficulties were pointed out: lack of time (job- or family-related causes) was the main reason for not pursuing the course by three out of the four students in Group B.

The study from Gilbert *et al.* (2007) identified the following criteria used by students in expressing their satisfaction: synergy between theory and practice; specific subjects themes; discussion forums and other student interaction; and other learning support. The themes that were associated with dissatisfaction include: inadequate robustness and usability of the platform; insufficient access to resources (such as articles and books); currency of study materials; and student work scheduling. Learning is an inherently social activity and as long as e-learning is more about technology than human interactions, it will probably remain a gadget for only the most motivated students (Eneroth, 2000).

Online education provides individuals with a busy lifestyle with an alternative to face-to-face courses, allowing them to proceed studies, at their own pace, and to identify their own personal course timeline (Shanley *et al.*, 2004). Online instruction allows students to have an accurate perception of the effectiveness of their own learning (Shohreh and Keesling, 2000), and online classes increase student-to-professor interaction as well as critical thinking (Hay *et al.*, 2004; Swan, 2003). Flexibility, interaction, teaching presence, collaborative learning and a great sense of community are very important aspects in online students' discourses (Hansen, 2008). This sense of online community seems to be a significant predictor of online learning outcomes (Arbaugh, 2005).

5. Conclusion

This study indicated – in global terms – that students felt a very high level of motivation and satisfaction with the e-learning post graduate programme in Environmental Citizenship and Participation. Two students, who quit the course during the first trimester, expressed a low level of satisfaction and motivation with the course.

The present study suggests that greater effort in motivating and giving ICT-support to students should be made, in the initial period of a course in e-learning, when, e.g. the e-learning community bonds are being formed, in order to reduce the number of students who quit the course. Allowing students to carry out their online studies in a part time regime, as well as more flexibility and better co-organization in the e-activities timetable are other lessons learned from the student's survey. Also, according to the student's judgment (on personal interviews) the inclusion of synchronous moments, for students to clear doubts of any sort, is unnecessary. The asynchronous tools of the coordination and secretary virtual spaces can be use for that purpose. All of these "lessons" are presently being implemented in the MSc in Environmental Citizenship and Participation.

The course contents, organisation and learning regime catalysed students to change their attitudes about environmental domains and to believe that they can contribute to others change of attitudes and behaviours.

E-learning brings new dimensions (to traditional education when it comes to adult learning) and increases the motivation to learn about environmental issues (if the e-learning for environment course allows for new ways of exploring and solving environmental problems in an interactive way). Moreover, it may increase the readiness to learn if the students are allowed to move into new social roles through the course (Eneroth, 2000).

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