

MOOC & B-learning: Students' Barriers and Satisfaction in Formal and Non-formal Learning Environments

Elba Gutiérrez-Santiuste
University of Córdoba

Vanesa-M. Gámiz-Sánchez, & Jose Gutiérrez-Pérez
University of Granada

Abstract

The study presents a comparative analysis of two virtual learning formats: one non-formal through a Massive Open Online Course (MOOC) and the other formal through b-learning. We compare the communication barriers and the satisfaction perceived by the students ($N = 249$) by developing a qualitative analysis using semi-structured questionnaires and content analysis of the virtual communication in both formats. The results show that the students perceive a low level of barriers and that statistically significant differences exist between the formal and non-formal groups regarding psychological and sociological issues. Our findings show that students express high satisfaction in both educational modes, while the groups' satisfaction differs in matters related to planning, content, professors, and communication. Finally, we reflect on the strengths and weaknesses of both modes, in hopes that the understanding gained from analyzing each mode may improve or complement the scenario of the other.

Information and communications technology (ICT) and communications networks offer new possibilities that are revolutionizing traditional learning environments. It is increasingly common to seek a virtual-world complement to face-to-face teaching through hybrid or blended-learning methodologies (Cabero, Llorente & Morales, 2013; Cheung, Lam, Lau & Shim, 2010; Chew, Jones & Turner, 2008; Gikandi, Morrow & Davis, 2011). The need to use methodologies that focus on the student and make learning spaces more flexible presents strong reasons for promoting blended-learning spaces for teaching and learning. Further, the latest trends provide new opportunities to develop educational experiences based on autonomous and connected learning, in Massive Open Online Courses (MOOCs). This kind of course seeks to take advantage, above all, of the capability to construct virtual learning communities through collaborative strategies (Allen & Seaman, 2013; SCOPEO, 2013).

Increasing importance is being attributed to the need to develop lifelong learning in non-formal and informal models of learning. The coexistence of these modes with formal learning makes in-depth study and analysis of their possibilities and limitations necessary. We analyze the

differences (barriers and satisfaction) between two groups of students with varying degrees of formality in their courses and different instructional designs (Table 1).

Table 1.
Differences Between Two Groups

	Group F	Group NF
Degree of formality	Formal. Within the official program.	Non-formal. Outside the official program.
Instructional design	b-learning (mixed learning: face-to-face and online).	e-learning (MOOC: entirely online).

This paper compares two experiences developed in technological learning environments with different degrees of formality in instruction: one within and one outside an official program. The goal is to observe whether there are fundamental differences in the barriers that both find, as well as to determine the satisfaction achieved in both learning experiences. We investigate whether any dimension clearly differentiates one type of experience from the other so that we can relate this dimension to the nature and characteristics of each mode of learning. This analysis leads us finally to reflect on the strengths and weaknesses of the experiences, in hopes that the understanding gained from analyzing each mode may improve or complement the scenario of the other. We use a mixed methodology, both quantitative and qualitative, and the same analytical tools for both groups.

Definition of Key Terms

The Organization for Economic Cooperation and Development (OECD, 2005, p. 5–6) indicates:

- Formal learning: It can be achieved when a learner follows a program of instruction in an educational institution or in the workplace. Formal learning is always recognized in a certificate or qualification.
- Non-formal learning: Learning which is embedded in planned activities not explicitly designated as learning (in terms of learning objectives, learning time or learning support), but which contain an important learning element. Non-formal learning is intentional from the learner's point of view. It typically does not lead to certification.

The formal environment (Group F) developed through b-learning instruction, for which Halverson (2014) combines both modes: face-to-face and online learning. The non-formal group (Group NF) performed its learning in an e-learning environment with entirely online instruction.

Background

Barriers in Formal and Non-Formal Instruction

Analysis of barriers in the teaching-learning processes of virtual education began at the end of the 1990s with studies by Berge and Mrozowski (1999), Berge (1998), Salmon and Giles (1998), Morgan and Tam (1999), and Betts (1998). This research was extended in the following decade, consolidating substantial knowledge on the topic.

There are three levels of analysis of the barriers in the use of ICTs in higher education. The first level is related to the barriers encountered by institutions and focuses on analysis of strategic planning, the absence of institutional policies, and the cost of implementation (Birch &

Burnett, 2009). Using qualitative information based on interviews with 14 professors, the study analyzes institutional barriers considered to be crucial in implementing e-learning courses. Birch and Burnett (2009) specifically indicates strategic planning, the absence of institutional policies, and the cost of implementation as barriers. Absence of strategic planning refers to the lack of coherent, flexible strategic plans at the program level. Institutional policy indicates aspects related to university management adaptable to different groups of students, design and delivery of course materials, the fact that “management has to come from above,” and the high cost of implementing courses with technological resources.

The second level is related to the barriers, whether external or internal, for professors (Sang, Valcke, Van Braak & Tondeur, 2010). Other studies have indicated low levels of the following to be obstacles: institutional support and preparation, technical support, time, and personal motivation. Resistance to change, failure to fulfil expectations, professional development, culture, inconsistency between the technology, and pedagogical beliefs are also mentioned (Veletsianos, Kimmons & French, 2013).

The third level relates to obstacles that students encounter in communication and learning when using ICTs. One factor that cuts across everyone involved in the process (institutions, professors, and students) is technical and technological (Johnson, Smith, Willis, Levine & Haywood, 2011), through issues such as bandwidth, poor functioning, and inadequate infrastructure. Other studies find, however, that students do not perceive technology as a barrier in their online courses (Simuth & Sarmany-Schuller, 2012).

The sociological and psychological barriers indicated by Berge (1998) are primarily ideological, cultural, or religious conceptions; problems with communication between peers or with the instructor (Koenig, 2010; Simuth & Sarmany-Schuller, 2012; Whelan, 2008); and slowness in giving feedback (Vonderwell, 2003). The psychological barriers are defined as individual impediments, such as anxiety, emotions, and motivation, which can condition the communication process and the feeling of self-efficacy in using ICTs (Hammond, Reynolds & Ingram, 2011). Other studies establish social interaction as one of the critical barriers for the development of virtual learning, in addition to administrative questions, the instructor, student motivation, time dedicated, and support for studies (Mullenburg & Berge, 2005).

Other possible barriers indicated in the literature involve cognitive aspects, such as processes of coding and decoding messages (Berge & Mrozowski, 1999), skill in handling technological tools (Salmon & Giles, 1998; Whelan, 2008), and cognitive abilities and learning styles (Koenig, 2010).

In the field of non-formal and informal learning, analysis of barriers is found primarily in relation to lifelong learning and adult education, with special attention to barriers encountered by students characterized as non-traditional learners (Lewis-Fitzgerald, 2005). The literature has described different types of barriers: attitudinal, physical and material, and structural (Hillage & Aston, 2001). Mental barriers relate to the individual’s culture and previous knowledge, financial barriers, access barriers, learning design barriers (failure to adapt to learners’ individual characteristics), and information barriers (insufficient and unattractive information) (Longworth, 2003).

In this mode, the first challenge is to get the participants involved in their own learning so that they overcome personal difficulties while supported by good use of ICTs (Laal, 2011). Kennedy (2014) includes the literature review on barriers in MOOCs and its relationship with high dropout rates. The author presents the contributions of Kop, Fournier & Mak (2011) that indicate barriers to learning were time zone and language differences, chaotic course structure,

connecting with others in different spaces, skills in the use of tools, power relations, and personal reasons. Another study notes technological skills and time constraints as barriers (Fini, 2009).

The barriers students encounter may influence their degree of satisfaction with the technologically mediated learning experience. A social barrier may lead to different levels of satisfaction or dissatisfaction in the interaction with classmates and professors, the learning climate, or various aspects of social presence (Muilenburg, 2005; Richardson, 2003; Swan, 2001; Vonderwell, 2003; Willging, 2009; Wu, 2011). Possible technical or technological barriers can also intensify the levels of satisfaction or dissatisfaction with the educational experience or even lead learners to abandon the course (Muilenburg, 2009; Ozkan, 2009; Willging, 2009).

Satisfaction and Dissatisfaction of Students in Formal and Non-Formal Learning

The degree of satisfaction that students perceive may be due to factors internal or external to them. Studies of student satisfaction in the 1990s focused on social issues. As more personal information is disclosed, more reciprocity occurs, more trust is established, and more students seek support and experience increased satisfaction (Cutler, 1995). Effective social presence is also a predictor of the degree of satisfaction among online students (Gunawardena & Zittle, 1997; Rourke, Anderson, Garrison & Archer, 1999).

Subsequent studies have investigated other reasons: (a) abilities relative to content, search for and management and creation of information, prior experience with technology, and support from professors and other administrative personnel, as well as the extent to which the content and presentation meet students' expectations (Mason & Weller, 2000); and (b) strong correlation between satisfaction and willingness to learn, online functions, and learning focuses (Gunawardena & Duphorne, 2000). Another study does not, however, find a relationship between satisfaction and the student's personality (Kanuka & Nocente, 2003).

In the last 15 years, in-depth analysis of social issues in virtual courses has continued, particularly of satisfaction with both peers and professors in these courses. For example, the studies focus on the fact of social presence in education and show that students confirm their satisfaction with this type of education, taking into account affective needs in the teaching-learning process (Gunawardena, 2003). In spite of the problem of conceptualizing and measuring social presence, Lowenthal (2009) indicates that other researchers have reached similar conclusions: students who identify with a high social presence feel very satisfied with professors, the learning perceived, and their relationship to fellow students—results that agree with those of the study by Cobb (2009). The relationship between feeling of satisfaction and social presence in virtual communication has implications for improving community building and participation in interactive discussions (Brady, Holcomb & Smith, 2010; Naveh, Tubin & Pliskin, 2010).

Other studies focus on the influence of social relationships with professors on satisfaction. The students see immediacy as a benefit, since communication provides a greater feeling of psychological closeness, creating a safe and rich interpersonal environment (Woods & Baker, 2004). In analyzing which factors make social communication effective, the most significant factor in student satisfaction is the social presence of the instructor (Richardson & Swann, 2003; Swan & Shih, 2005). Other studies also show a relationship between satisfaction with the degree of students' activity and interrelation between classmates (Arbaugh, 2000; Shen, Tsai & Marra, 2013). The study by Arbaugh (2000) finds a negative correlation between difficulty of interaction and satisfaction, and a positive correlation between interaction with professors and satisfaction. This study also finds that flexibility of the medium and capacity to

develop an environment that facilitates interaction are determining factors in students' satisfaction, exerting more influence than frequency of use.

In recent years, research has also focused on analyzing other factors, such as learning climate and expectations for performance, where climate is conditioned by interaction (Wu, Tennyson & Hsia, 2010), cognitive presence (Arbaugh, 2008), academic success (Baturay, 2011; García-Varcárcel & Tejedor, 2012) and administrative support services (Jackling & Natoli, 2011), and organizational factors, such as websites, university policy, size of the course staff, course year and discipline, and course content (Naveh et al., 2010). Ozkan and Koseler (2009) propose a model for analyzing student satisfaction that focuses on six dimensions: system quality, service quality, content quality, learner perspective, instructor attitudes, and supportive issues. The analysis by Overbaugh and Nickel (2011) indicates that students are satisfied with the high degree of perception of learning and prefer a collaborative work method, although students did not identify community building as a determinant of their satisfaction.

The literature establishes a series of factors that cause dissatisfaction in online students and contribute to their dropping out of courses (Willging & Johnson, 2004). The main reason among these factors was the level of discontent—during the first levels of study—generated by discrepancies between personal or professional interests and the structure of the course, a low level of trust in distance education, doubts about successful communication online, and incompetence in using the virtual education software as an effective learning tool. Other studies establish technical issues, issues related to content, tasks and structure, and interaction with professors as motives for dissatisfaction. Specifically, dissatisfaction concerned professors' training in how to demonstrate functioning of the platform used and behaviour relative to assessment, difficulty in understanding, and unsuitability of content (Cabero et al., 2010).

In the non-formal or informal modes, the student does not in principal aspire to achieve an official accreditation. This means that his or her expectations concerning issues such as community development, adult literacy, workplace learning, or personal interest learning may be somewhat different (Zepke & Leach, 2006). Research on satisfaction articulated by students has not developed good differentiation between formal and non-formal environments (Eshach, 2007; Rodd, 2013). The relationship between students and education institutions is increasingly approached as an exchange between customer and supplier. This means in some cases that the frames of reference for analyzing student satisfaction change, tending more toward mere opinion about the service received than toward evaluating the complexity of a learning and educational experience (Sax, 2004). Along these lines, another study approaches the analysis of student satisfaction from models of business practice rather than assumptions of psychological perception (Rodd, 2013).

Hypotheses

- H1: The barriers students encounter in formal and non-formal learning environments mediated by technology are of the same type and similar proportions.
- H2: The reasons for satisfaction and dissatisfaction detected in formal and non-formal instruction mediated by technology are of the same type and similar proportions.

Method

The study performed here is descriptive-exploratory, combining quantitative and qualitative research methods. A study may require qualitative and quantitative methods, based on the research goal (Spector, 2008) or pragmatic reasons (Litchman, 2013) such as the need to observe the object of analysis from different perspectives. In our case, we used the qualitative method with quantified content analysis to obtain the understanding and interpretation of issues and factors that can influence students' barriers and satisfaction. Counting frequency is used for non-inferential descriptive goals, reducing information to numerical description that can be analyzed statistically (Gerbic, 2005).

We used the quantitative method to systematize the information into measurable results for comparing the two instructional designs. Our decision is based on the complexity of real-life situations and the development of the process itself (Steven, 2008).

The methodology employed to analyze students' barriers and satisfaction consists of observation through qualitative analysis of the issues expressed by the students in both groups (F and NF). We then analyzed the differences between the two groups, using the means and magnitude of the differences, and proceeded to contrast the qualitative and quantitative analyses.

The research design used is *ex post facto* descriptive-exploratory (Campbell & Stanley, 1973). We analyze the results of the two groups of variables with two levels of definition in each variable and thus identify a 2x2 factor design. Variable 1 (learning environment) has two levels of definition: formal and non-formal. Variable 2 (instructional design) has two more: b-learning and e-learning.

Sample

To analyze the educational experiences in formal and non-formal environments, we used two groups of students from a Spanish university. Group F (formal, b-learning) was composed of 64 students from the third year of an undergraduate program in Foreign Languages, in the subject "ICTs applied to Education." Group NF (non-formal, e-learning) was composed of 185 students in a MOOC (992 students began the course). The course was widely publicized on teaching forums, webpages, and social networks. It was a course on "Ubiquitous Learning" within the *Abierta* initiative organized by the University of Granada, Spain.

The distribution of the sample is shown in Table 2:

Table 2.

Age Range of Students

Group	Age range (%)				Gender	
	<20	20-30	31-45	46-60	Men	Women
Formal	1.6	91.9	6.4	—	9.67%	90.33%
Non-formal	3.8	40	33.5	17.7	40.54%	59.46%

Course Design in the Formal Environment

The methodology used in this course followed a socio-constructivist approach in which the professors assumed the role of manager, guide, and mentor. The students were co-participants in knowledge construction through discussion, contrast of ideas, and collaboration, along the lines of the approach in Mercer and Howe (2012). The students had other face-to-face courses and, for the course analyzed here, had some face-to-face classes, specifically, two

classroom sessions in which the course objectives, methodology, and text-based communication instruments were explained. After these sessions, communication took place online. The students had to analyze a series of documents with educational content (videos, ebooks, blogs, forums, wikis, webpages, and reports) in order to participate in the forums. The forums were open for a period of three months.

Course Design in the Non-Formal Environment

The course was four weeks long, and during this time students worked on four blocks of content related to the use of new methodologies and new resources in teaching-learning processes. The course design followed studies performed in cMOOCs (Siemens, 2005), and the content was developed collectively from documents and references presented as starting points for collaborative reflection.

Instruments

A four-level online questionnaire with Likert-type responses (1 = completely disagree / 4 = completely agree [see Appendix]) (Spector, 1992) contained items that referred to two constructs—barriers and satisfaction—and was completed by the students at the end of the course. As a publication tool, we used the online Google Drive (non-formal group) and LimeSurvey (formal group); the data analysis software was NVivo v. 8 (qualitative) and SPSS v.20 (quantitative). We analyzed four types of barriers based on the proposals by Berge (1998), Berge and Mrozowski (1999), and Rotta and Ranieri (2005), which grant content validity to the instrument:

- Sociological: factors that can make fluid virtual communication impossible due to ideological, cultural, or religious conceptions.
- Psychological: individual impediments, such as anxiety, emotions, motivation, interests, temperament, or rivalries that can condition the communication process.
- Technical/Technological: technical/technological situations that slow virtual communication or make it impossible, such as: connection, bandwidth, poor functioning, insufficient infrastructure, or quality of transmission.
- Cognitive: difficulty with virtual communication, based on lack of knowledge or ability in prior learning, whether academic, technical, or technological, related to preparation in handling the virtual tools.

The aspects of satisfaction were also measured with a Likert scale ranging from 1 to 4 (the higher values indicate a higher satisfaction with the course). The items were based on contributions by Cabero et al. (2010), Mason and Weller (2000), Rourke et al. (1999), and Woods and Baker (2004), with the dimensions:

- Planning: instructional design, choice of topics, course organization, number of participants, course duration.
- Content: content, resources.
- Participation: level of involvement and of contributions to the course.
- Professors: professors' performance.
- Community: social character, community and group work, sharing outside the platform.
- Conclusions of the course or of modules.
- Overall assessment of the course.

We performed a confirmatory factor analysis to determine the validity of the questionnaire construct used, differentiating clearly between two factors: barriers and satisfaction (Table 3).

Table 3.
Point Values for Factors

	Barriers	Satisfaction
Psychological Barriers	.839	
Technical/Technological Barriers	.720	
Sociological Barriers	.895	
Cognitive Barriers	.825	
Planning		.626
Content		.760
Participation		.687
Professors		.715
Community		.734
Conclusions		.680
Overall assessment		.606

The reliability of the evaluation instrument was determined using the Cronbach's alpha coefficient. We obtained a value of $\alpha = .83$ for the construct Barriers and $\alpha = .81$ for the construct Satisfaction.

The qualitative analysis started from open questions in the questionnaire. We extracted the following categories by deduction: planning, community, professors, technical, design, assessment, and personal. We performed an interobserver agreement estimation analysis ($icc = 0.66$), which, according to Landis and Koch (1977), represents substantial and acceptable agreement.

At the end of each of the experiences, we gathered the students' opinions about satisfaction and barriers encountered using the items in the questionnaires and the open questions. We then compared the results obtained to establish the similarities and differences, according to the students' opinions. Analysis of the data collected from the questionnaire items was performed using statistical analysis techniques (mean, Standard Deviation, Mann-Whitney U test, Kolmogorov-Smirnov test, and Levene's test), and content analysis was employed for the open questions.

Results

H1: The Barriers Students Encounter in Formal and Non-Formal Learning Environments Mediated by Technology are of the Same Type and Similar Proportions

To obtain conclusions related to H1, we performed one qualitative and another quantitative analysis.

Students' barriers: qualitative analysis. In the qualitative analysis, we analyzed 255 thematic units to consider the type and level of barriers expressed by the students in Groups F and NF. The qualitative analysis established the variety and type of barriers encountered by the students in their online courses.

In Group F, we found that 45.5% of the thematic units referred to barriers and in Group NF 39.5%. The distribution of the type of barrier is shown in Figure 1:

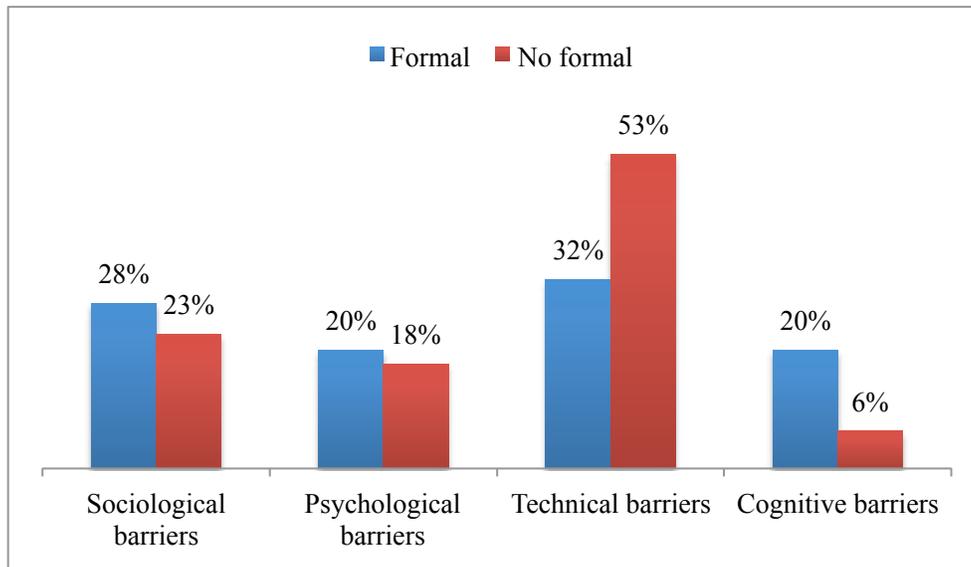


Figure 1. Barriers according to learning environment.

Figure 1 shows the findings related to the barriers, where technical barriers are those most often expressed by the students in their comments. The technical obstacles refer especially to the graphic and organizational format of the platform in Group NF: “They should improve the possibility of following the threads in the forum in which you participated. With so many comments, it is complicated to see whether someone has answered and to keep up the conversation and reflection” (Group NF).

Sociological questions were also an impediment to developing the learning goals and could include different ideological, cultural, or religious conceptions among the participants: “Also, a lot of people throw out ideas without any relation to what was asked for, or they repeat” (Group F). In addition, we found psychological barriers, although in a lower percentage, related to personal obstacles, such as anxiety, motivation, or emotions that the students encounter in the technologically mediated learning process. The cognitive barriers refer to difficulties generated by lack of technical or academic knowledge.

As to the barriers that the students perceived, we found the greatest differences between the formal and the non-formal group in the technical and cognitive barriers. Whereas the students in the non-formal group perceived a greater presence of technical barriers (a 21% difference between the groups), those in the formal group perceived greater cognitive barriers than those in the non-formal group (a 14% difference). For the other two types of barriers, we found more similar results in the two groups.

Students’ barriers: quantitative analysis. The quantitative analysis enabled us to determine the magnitude and seriousness of the obstacles that the students perceived in the two learning environments, formal and non-formal.

We found differences between Groups F and NF in the barriers that students encountered.

Table 4
Sample Statistics

Barriers	Group	M	SD	SE
Psychological barriers	F	1.45	.84	.10
	NF	1.88	.93	.06
Technical barriers	F	1.91	.99	.12
	NF	2.16	.95	.07
Sociological barriers	F	1.19	.47	.06
	NF	1.63	.92	.06
Cognitive barriers	F	1.75	.80	.10
	NF	2.06	.99	.07

Table 4 shows that both groups perceive a low presence of obstacles. To observe the magnitude of the barriers and to verify this first approach, we decided to perform the three kinds of analysis described in Table 5:

Table 5
Contrast of Means in Groups F and NF

	Levene		Mann-Whitney		Kolmogorov-Smirnov		Cohen's d
	F	<i>p</i> (2-tailed)	Z	Asymp. Sig.	Z	Asymp. Sig.	
Psychological barriers	2.91	.001	-3.59	.000	1.93	.001	-.47
Technical barriers	.12	.087	-1.84	.065	1.04	.225	—
Sociological barriers	44.31	.000	-3.42	.001	1.51	.021	-.52
Cognitive barriers	1.86	.031	-1.94	.051	0.79	.054	-.32

In contrasting the results of the analyses performed (Mann-Whitney U test, Kolmogorov-Smirnov test, and Levene's test), we observe differences according to the type of barrier analyzed.

In the case of psychological barriers, the results are highly significant in the three analyses performed. We can reject H₀ of equality of means, since there are statistically significant differences in the psychological barriers between Groups F and NF, showing a medium-level difference (Cohen, 1988).

As to the sociological barriers, the results are highly significant in two of the tests performed (Levene and Mann-Whitney) and significant in the Kolmogorov-Smirnov test. In any case, we can affirm a difference between Groups F and NF in the sociological barriers perceived and identify the effect of this difference as of medium level (Cohen, 1988).

In the analysis of the technical barriers, we see that there is no evidence to reject the null hypothesis. We cannot therefore affirm statistically significant differences between the two groups.

In the case of the cognitive barriers, the Mann-Whitney U and Kolmogorov-Smirnov tests locate the p -value very close to the limit ($Sig. = .51$ and $Sig. = .54$, respectively), preventing us from rejecting H_0 in favour of H_a . Levene's test indicates, however, that the results are significant and thus that there is a statistically significant difference in the cognitive barriers between the groups (F and NF), with a small effect (Cohen, 1988). In the light of the results of the quantitative analysis, we believe that there are intermediate-level differences in evaluation of the barriers found between Groups F and NF for psychological and sociological barriers. The difference between Groups F and NF in evaluation of the technical barriers is low. There is no difference in evaluation of the cognitive barriers between the two groups.

Contrast of the qualitative and quantitative data obtained. In contrasting the analyses of the qualitative and quantitative data, we find that the technical barriers are the type most perceived in both groups. We do not find statistically significant differences between the two groups. The students in both learning environments perceive technical barriers in the same way. The students also identify sociological barriers, with the differences between Groups F and NF indicating that students in Group NF perceive more sociological barriers. The students express a lower percentage of psychological than of technical barriers, and there are differences between the two groups. The study also finds that Group NF perceives more technical barriers. The obstacles least expressed by the students are cognitive, and the differences between the two groups show that Group NF perceives more such barriers.

H2: The Reasons for Satisfaction and Dissatisfaction Detected in Formal and Non-Formal Instruction Mediated by Technology are of the Same Type and Similar Proportions

Students' satisfaction/dissatisfaction: qualitative analysis. As to H2, the qualitative analysis provides information on the students in Group F (61.8% expression of satisfaction and 38.2% of dissatisfaction), specifying reasons for satisfaction more often in Group NF (19.9% satisfaction and 80.1% dissatisfaction).

First, we analyzed the reasons for satisfaction and dissatisfaction in the two groups through the content analysis of the open question on the questionnaire. The results are shown in Figures 2 and 3.

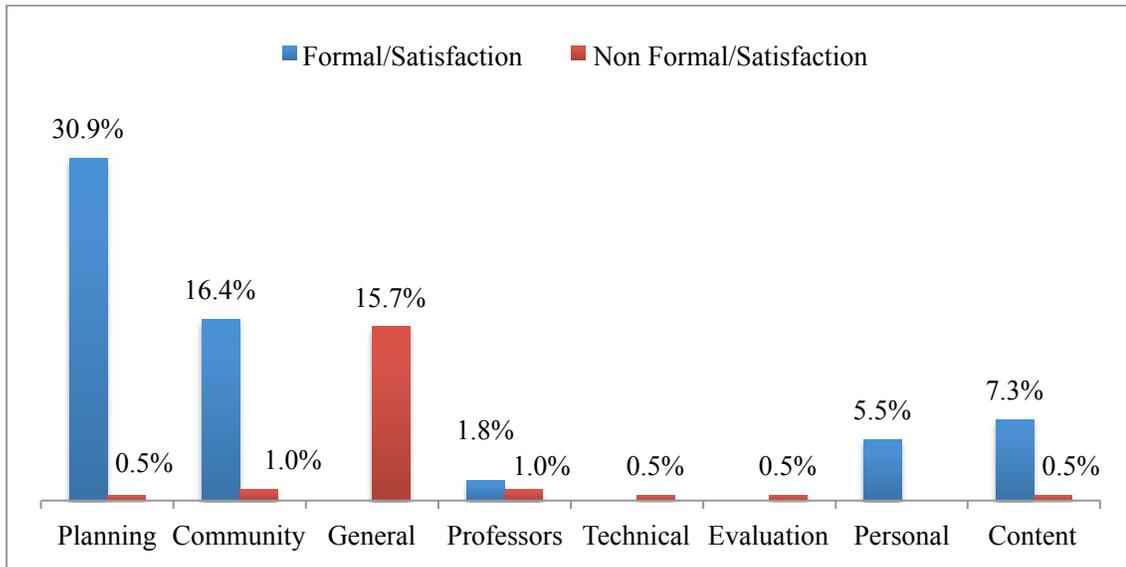


Figure 2. Reasons for satisfaction according to learning environment.

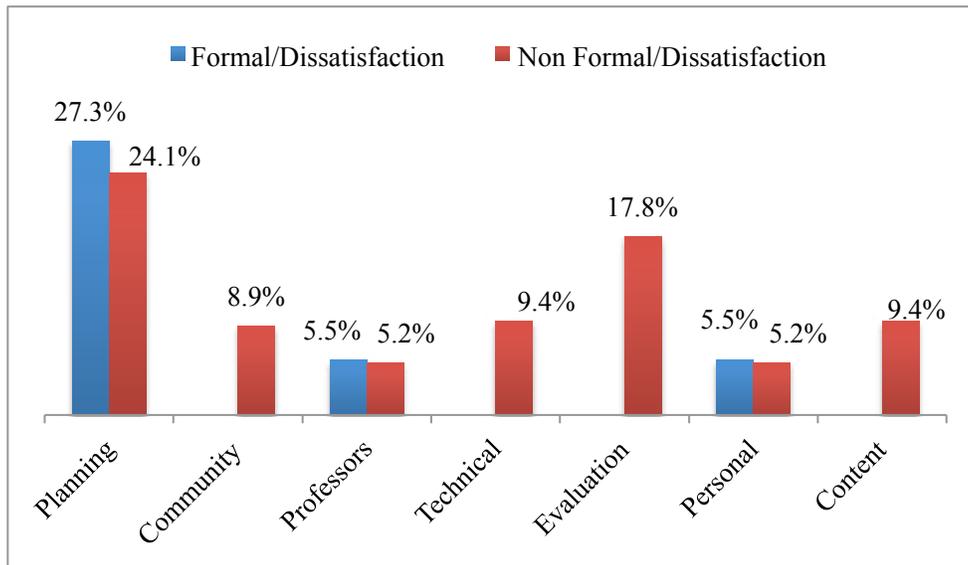


Figure 3. Reasons for dissatisfaction according to learning environment.

We did not find thematic units related to either Conclusions or Participation. The students expressed their satisfaction more in Group F, and the students in Group NF mentioned their reasons for dissatisfaction more often. The reasons for satisfaction in Group F involve creation of community in the virtual course, and planning, which is related to instructional design, choice of topics, course organization, and course duration. We find communications like the following: “We followed an order in the topics, which gave us the opportunity to express ourselves freely and in an orderly way” (Group F). In Group NF, however, the students referred to their

satisfaction in more general terms. For example, we find comments like: “Everything seemed great to me” (Group NF).

The reasons for dissatisfaction in Group F focus on the same issues as those given for satisfaction: Planning, particularly in the course design. Group NF also expressed dissatisfaction with Assessment and Planning. In Group F, the reason most often expressed for dissatisfaction was Planning, particularly design, followed by Evaluation. For example: “After the surveys, it would be good to have some type of graph where we could see the results” (Group NF) and “There were a lot of contributions, and it was sometimes complicated to follow the different comments” (Group F).

In Group NF, the reasons for dissatisfaction most often expressed indicated the method of assessment, such as: “There should have been a weekly test to see if you really learned something or whether you watched the videos” (Group NF).

Student satisfaction: quantitative analysis. We expanded the data obtained in the qualitative analysis through the students’ perception of satisfaction expressed in the questionnaires. There are appreciable differences between Groups F and NF in the qualitative analysis. As one can observe in Figure 2, students in Group F expressed their satisfaction with Planning 15.9% more than those in Group NF. Only Group NF expressed satisfaction with technical aspects and evaluation. The analysis of the quantitative data from the questionnaire on satisfaction is shown in Table 6:

Table 6
Statistics for Satisfaction According to Learning Environment

	Group	M	SD	SE
Overall assessment	F	3.79	.48	.06
	NF	3.72	.45	.03
Conclusions	F	3.40	.66	.08
	NF	3.39	.50	.03
Planning	F	3.67	.50	.06
	NF	3.38	.51	.03
Content	F	3.80	.28	.03
	NF	3.37	.56	.04
Participation	F	3.62	.69	.08
	NF	3.50	.52	.03
Professors	F	3.70	.33	.04
	NF	3.24	.59	.04
Community	F	3.62	.46	.05
	NF	3.24	.52	.03

The students in both Group F and Group NF were highly satisfied (min = 3.24; max = 3.80), although the means are slightly higher in Group F. The students in both groups rated their general impression of the course very positively. The formal group also assigned higher point values to satisfaction with contents, whereas the non-formal group of students was highly satisfied with participation.

As with the analysis of the barriers, we then proceeded to analyze the difference between the means for satisfaction of Groups F and NF.

Table 7

Contrast of Means and Magnitude of Difference Between Groups F and NF

	Levene		Mann-Whitney		Kolmogorov-		Cohen's d
	F	Sig.	Z	Asymp.	Z	Asymp.	
		(2 tailed)		Sig.		Sig.	
Overall assessment	.31	.350	-3.02	.003	1.84	.002	—
Conclusions	19.17	.904	-.29	.767	1.10	.172	—
Planning	.38	.000	-3.72	.000	2.39	.000	-.55
Content	28.25	.000	-5.40	.000	3.16	.000	-.81
Participation	.06	.170	-2.45	.014	1.76	.004	—
Professors	7.50	.000	-5.11	.000	4.03	.000	-.80
Community	.77	.000	-5.31	.000	4.17	.000	-.72

By contrasting the results of the analyses presented in Table 7, we can establish different conclusions according to the type of satisfaction analyzed.

There is a highly significant difference between Groups F and NF in the factors Planning, Content, Professors, and Community. We can thus affirm differences between Groups F and NF, with medium and large effects (Cohen 1988).

In the case of Overall Assessment and Participation, the Mann-Whitney U and Kolmogorov-Smirnov tests show statistically or highly significant differences between Groups F and NF. Levene's test, however, shows a p -value of higher than .05, raising doubt as to whether or not we should consider the results based on the two previous tests.

In analyzing the variable Conclusions, we did not find evidence to reject the null hypothesis and cannot therefore affirm that there are significant differences between the two groups. In the light of the results of the quantitative analysis, we believe there are significant differences between the satisfaction of students in Groups F and NF with the aspects of Planning, Contents, Professors, and evaluation of Community; Group F expresses greater satisfaction.

Contrast of the qualitative and quantitative data obtained. Based on the information provided by the questionnaires, we believe that the students are more satisfied in a formal environment in matters related to course planning, content, professors, and community. The students in the formal and the non-formal groups had a similar perception concerning their overall assessment of the course, the conclusions drawn from it, and participation.

Conclusions

This article has attempted to compare two modes of the relation of virtual learning environments (formal and non-formal) to student barriers and satisfaction. Our main goal was to find possible complementarities between the two environments explained in Bruff, Fisher, McEwen & Smith (2013), could strengthen both types of experience.

In comparing the results on the barriers that the students expressed, we did not find statistically significant differences in the technical and technological barriers between the two groups analyzed. Both groups perceived technical/technological barriers as the greatest obstacle to carrying out their learning processes. Both groups also stressed this type of barrier in the qualitative comments in a greater proportion. For our students, technical problems cause the greatest difficulties in dealing with a virtual experience in both modes. These barriers are external to the students and thus do not permit us to establish a relation to the students' competences.

The other barriers that the students mention most are, in the following order, sociological, psychological, and cognitive, and we find significant differences between the two groups. It seems that this type of barrier does take the personal characteristics of the students more into account. It is possible that the differences found in both groups are due to factors such as the more homogeneous ages of the formal group or to other factors not considered in this study. These human barriers are much more complex and challenging, as Spector (2013) argues and as Mulenburg and Berge (2005) and Simuth and Sarmany-Schuller (2012) affirm, stressing social interaction as a critical factor. Koenig (2010) also stresses cognitive barriers as a source of differences.

The results obtained concerning the students' opinions show high satisfaction in both groups. Group F is more satisfied with planning, course design, and community created. This feeling of community may be due to the partially face-to-face mode of learning. The students in the non-formal group give more general reasons for arguing their satisfaction and express their dissatisfaction primarily with planning, design, and assessment. Student dissatisfaction in the formal group involves primarily design and planning. It seems that one of the greatest problems for students in non-formal massive courses is assessment (O'Toole, 2013), although the students also do not seem to be very satisfied with the community created, whereas community was one of the main advantages mentioned in the formal environment. From the data gathered in the questionnaire, it is worth noting the differences that occur between one environment and the other regarding satisfaction with content, professors, community, and planning. As stated above, creating community seems to be one of the main points of divergence, as is mentoring, which is much more direct and personalized in the formal environment than in the non-formal environment and thus takes on a more energizing role. This result could indicate a relationship between satisfaction and the number of students in a virtual experience (Naveh, 2010) or between satisfaction and interaction with professors and classmates (Swan, 2006). Other studies also establish a direct relationship between satisfaction and course design and content (Swan et al., 2001; Kanuka, 2003).

The limitations of this study stem from the lack of analysis of cultural context, prior knowledge, and gender and age of the students in this type of activity, which could be determining factors and should be explored in future studies.

References

- Allen I. E., & Seaman J. (2013). *Changing course: Ten years of tracking online education in the United States*. San Francisco, CA: Babson Survey Research Group and Quahog Research Group, LLC.
- Arbaugh, J. B. (2000). Virtual classroom characteristics and student satisfaction with Internet-based MBA courses. *Journal of Management Education*, 24, 32–54. doi:10.1177/105256290002400104
- Arbaugh, J. B. (2008). Does the community of inquiry framework predict outcomes in online MBA courses? *The International Review of Research in Open and Distance Learning*, 9(2).
- Baturay, M. H. (2011). Relationships among sense of classroom community, perceived cognitive learning and satisfaction of students at an e-learning course. *Interactive Learning Environments*, 19(5), 563–575. doi:10.1080/10494821003644029
- Berge, Z. L. (1998). Barriers to online teaching in post-secondary institutions: Can policy changes fix it? *Online Journal of Distance Learning Administration*, 1(2).
- Berge, Z. L., & Mrozowski, S. E. (1999). Barriers to online teaching in elementary, secondary, and teacher education. *Canadian Journal of Educational Communication*, 27(2), 125–138.
- Betts, K. S. (1998). An institutional overview: Factors influencing faculty participation in distance education in the United States: An institutional study. *Online Journal of Distance Learning Administration*, 1(3).
- Birch, D., & Burnett, B. (2009). Bringing academics on board: Encouraging institution-wide diffusion of e-learning environments. *Australasian Journal of Educational Technology*, 25(1), 117–134.
- Brady, K. P., Holcomb, L. B., & Smith, B. V. (2010). The use of alternative social networking sites in higher educational settings: A case study of the e-learning benefits of Ning in education. *Journal of Interactive Online Learning*, 9(2), 151–170.
- Bruff, D. O., Fisher, D. H., McEwen, K. E., & Smith, B. E. (2013). Wrapping a MOOC: Student perceptions of an experiment in blended learning. *MERLOT Journal of Online Learning and Teaching*, 9(2), 187–199.
- Cabero, J. (Dir.), Llorente, M. C., Romero, R., Barroso, J., Román, P., Ballester, C., ... et al. (2010). *Usos del e-learning en las universidades andaluzas: Estado de la situación y análisis de buenas prácticas. Resumen Ejecutivo*. Seville, Spain: Secretaría General de Universidades, Investigación y Tecnología. Junta de Andalucía.
- Cabero, J., Llorente, M.C., & Morales, J.A. (2013). Aportaciones al e-learning desde un estudio de buenas prácticas en las universidades andaluzas. *Revista de Universidad y Sociedad del Conocimiento*, 10(1), 45–58. doi:10.7238/rusc.v10i1.1159
- Campbell, D., & Stanley, J. (1973). *Diseños experimentales y cuasiexperimentales en la investigación social*. Buenos Aires, Amorrortu.
- Cheung, K.S., Lam, J., Lau, N., & Shim, C. (2010, December). *Instructional design practices for blended learning*. 2010 International Conference on Computational Intelligence and Software Engineering, CiSE 2010, art. no. 5676762. Wuhan, China.
- Chew, E., Jones, N., & Turner, D. (2008). *Critical review of the blended learning models based on Maslow's and Vygotsky's educational theory*. *Hybrid Learning and Education*, Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics), 5169 LNCS, 40–53.

- Cobb, S. C. (2009). Social presence and online learning: A current view from a research perspective. *Journal of Interactive Online Learning*, 8(3), 241–254.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.
- Cutler, R. (1995). Distributed presence and community in cyberspace. *Interpersonal Computing and Technology: An Electronic Journal for the 21st Century*, 3(2), 12–32.
- Eshach, H. (2007). Bridging in-school and out-of-school learning: Formal, non-formal, and informal education. *Journal of Science Education and Technology*, 16(2), 171–190. doi:10.1007/s10956-006-9027
- Fini, A. (2009). The technological dimension of a Massive Open Online Course: The case of the CCK08 course tools. *The International Review of Research in Open and Distance Learning*, 10(5).
- García-Varcárcel, A., & Tejedor, J. (2012). The incorporation of ICT in higher education: The contribution of ROC curves in the graphic visualization of differences in the analysis of the variables. *British Journal of Educational Technology*, 43(6), 901–919. doi:10.1111/j.1467-8535.2011.01270.x
- Gikandi, J. W., Morrow, D., & Davis, N. E. (2011). Online formative assessment in higher education: A review of the literature. *Computers & Education*, 57(4), 2333–2351. doi:10.1016/j.compedu.2011.06.004
- Gunawardena, C. N. (2003). *Social presence and the sociocultural context of online education*. Retrieved from http://aof20.anadolu.edu.tr/bildiriler/Charlotte_Lani.doc
- Gunawardena, C. N., & Duphorne, P. L. (2000). Predictors of learner satisfaction in an academic computer conference. *Distance Education*, 21(1), 101–117 doi:10.1080/0158791000210107
- Halverson, L.R., Graham, C.R., Spring, K. J., Drysdale, J. S., & Henrie, C.R. (2014). A thematic analysis of the most highly cited scholarship in the first decade of blended learning research. *Internet and Higher Education*, 20, 20–34. doi:10.1016/j.iheduc.2013.09.004
- Hammond, M., Reynolds, L., & Ingram, J. (2011). How and why do student teachers use ICT? *Journal of Computer Assisted Learning*, 27, 191–203. doi:10.1111/j.1365-2729.2010.00389.x
- Hillage, J., & Aston, J. (2001). *Attracting new learners - a literature review*. London: IES and Learning and Skills Development Agency (LSDA). Retrieved from <http://www.employment-studies.co.uk/pubs/summary.php?id=1436learn>
- Jackling, B., & Natoli, R. (2011). Student engagement and departure intention: An Australian university perspective. *Journal of Further & Higher Education*, 35(4), 561–579. doi:10.1080/0309877X.2011.584970
- Johnson, L., Smith, R., Willis, H., Levine, A., & Haywood, K. (2011). *The 2011 Horizon Report* (p. 32). Austin, Texas: The New Media Consortium.
- Kanuka, H., & Nocente, N. (2003). Exploring the effects of personality type on perceived satisfaction with web-based learning in continuing professional development. *Distance Education*, 24(2), 227–244. doi:10.1080/0158791032000127491
- Kennedy, J. (2014). Characteristics of Massive Open Courses (MOOCs): A research review, 2009-2012. *Journal of Interactive Online Learning*, 13(1), 1–16.
- Koenig, R. J. (2010). Faculty satisfaction with distance education: A comparative analysis on effectiveness of undergraduate course delivery modes. *Journal of College Teaching and Learning*, 7(2), 17–24.

- Kop, R., Fournier, H., & Mak, J. S. F. (2011). A pedagogy of abundance or a pedagogy to support human beings? Participant support on Massive Open Online Courses. *The International Review of Research in Open and Distance Learning*, 12(7).
- Laal, M. (2011). Barriers to lifelong learning. *Procedia Social and Behavioral Sciences*, 28, 612–615, doi:10.1016/j.sbspro.2011.11.116.
- Landis, J. R., & Koch, G. G. (1977). The measurement of observer agreement for categorical data. *Biometrics*, 33, 159–174.
- Lewis-Fitzgerald, C. (2005). *Barriers to participating in learning and in the community*. RMIT University, RMIT Learning Networks / Community & Regional Partnerships / IECD, Melbourne, Australia. Retrieved from <https://ala.asn.au/conf/2005/downloads/papers/workshops/Cheryl%20Lewis%20Barriers%20to%20learning.pdf>
- Longworth, N. (2003). *Lifelong learning in action: Transforming education in the 21st century*. London: Kogan Page.
- Lowenthal, P. R. (2009). Social presence. In P. Rogers, G. Berg, J. Boettcher, C. Howard, L. Justice, & K. Schenk (Eds.), *Encyclopedia of distance learning* (2nd ed., p. 2612). IGI Global.
- Mason, R., & Weller, M. (2000). Factors affecting students' satisfaction on a web course. *Australian Journal of Educational Technology*, 16(2), 173–200.
- Mercer, N., & Howe, C. (2012). Explaining the dialogic processes of teaching and learning: The value and potential of sociocultural theory. *Learning, Culture and Social Interaction*, 1(1), 12–21, doi:10.1016/j.lcsi.2012.03.001
- Morgan, C. K., & Tam, M. (1999). Unravelling the complexities of distance education student attrition. *Distance Education*, 20(1), 96–108. doi:10.1080/0158791990200108
- Muilenburg, L. Y., & Berge, Z. L. (2005). Student barriers to online learning: A factor analytic study. *Distance Education*, 26(1), 29–48. doi:10.1080/01587910500081269
- Naveh, G., Tubin, D., & Pliskin, N. (2010). Student LMS use and satisfaction in academic institutions: The organizational perspective. *Internet and Higher Education*, 13, 127–133. doi:10.1016/j.iheduc.2010.02.004
- Organisation for Economic Co-operation and Development (OECD) (2005). *The role of the national qualifications system in promoting lifelong learning*. Report from thematic group 2. Retrieved from <http://www.oecd.org/education/innovation-education/34376318.pdf>
- Overbaugh, R. C., & Nickel, C. E. (2011). A comparison of student satisfaction and value of academic community between blended and online sections of a university-level educational foundations course. *The Internet and Higher Education*, 4(3), 164–174. doi:10.1016/j.iheduc.2010.12.001
- Ozkan, S., & Koseler, R. (2009). Multi-dimensional students' evaluation of e-learning systems in the higher education context: An empirical investigation. *Computer & Education*, 53, 1285–1296. doi:10.1016/j.compedu.2009.06.011
- Richardson, J. C., & Swan, K. (2003). Examining social presence in online courses in relation to students' perceived learning and satisfaction. *Journal of Asynchronous Learning Networks*, 7(1), 68–88.
- Rodd, J. (2013). *The relationship between self-determination, achievement goal orientation and satisfaction with the learning experience: Working with adult lifelong learners*. (Doctoral

- dissertation), State University of New York at Albany, Albany. Retrieved from <http://search.proquest.com/docview/1441073872>
- Rourke, L., Anderson, T., Garrison, D. R., & Archer, W. (1999). Assessing social presence in asynchronous text-based computer conferencing. *The Journal of Distance Education*, 14(2), 50–71.
- Salmon, G., & Giles, K. (1999). Creating and implementing successful online learning environments: A practitioner perspective. *European Journal of Open, Distance and E-learning*, 1–5.
- Sang, G., Valcke, M., Van Braak, J., & Tondeur, J. (2010). Student teachers' thinking processes and ICT integration: Predictors of prospective teaching behaviors with educational technology. *Computers & Education*, 54(1), 103–112. doi:10.1016/j.compedu.2009.07.010
- Sax, B. (2004). Students as “customers”. *On the Horizon*, 12(4), 157–159. doi:10.1108/10748120410564467
- SCOPEO (2013). *Informe N. 2: MOOC: Estado de la situación actual, posibilidades, retos y futuro*. June 2013. Retrieved from <http://scopeo.usal.es/wp-content/uploads/2013/06/scopeoi002.pdf>
- Shen, D., Cho, M.H., Tsai, C.L., & Marra, R. (2013). Unpacking online learning experiences: Online learning self-efficacy and learning satisfaction. *Internet and Higher Education*, 19, 10–17. doi:/10.1016/j.iheduc.2013.04.001
- Siemens, G. (2005). Connectivism: A learning theory for the digital age. *International Journal of Instructional Technology and Distance Learning*, 2(1), 3–10.
- Simuth, J., & Sarmany-Schuller, I. (2012). Principles for e-pedagogy. *Procedia Social and Behavioral Sciences*, 46, 4454–4456. doi:10.1016/j.sbspro.2012.06.274
- Spector, P.E. (1992). *Summary ratings scale construction: An introduction*. London: Sage.
- Spector, J. M. (2013). Emerging educational technologies and research directions. *Educational Technology & Society*, 16(2), 21–30.
- Steven, M.R. (2008). Research designs. In M. J. Spector, M. D. Merrill, J. Van Merriënboer, & M. P. Driscoll (Eds.), *Handbook of research on educational communication and technology* (3th ed., pp. 715–762). New York: Lawrence Erlbaum.
- Swan, K. (2001). Virtual interaction: Design factors affecting student satisfaction and perceived learning in asynchronous online courses. *Distance Education*, 22(2), 306–331. doi:10.1080/0158791010220208
- Swan, K., & Shih, L. F. (2005). On the nature and development of social presence in online course discussions. *Journal of Asynchronous Learning Networks*, 9(3), 115–136.
- Veletsianos, G., Kimmons, R., & French, K. D. (2013). Instructor experiences with a social networking site in a higher education setting: Expectations, frustrations, appropriation, and compartmentalization. *Educational Technology Research & Development*, 61, 255–278. doi:10.1007/s11423-012-9284-z
- Vonderwell, S. (2003). An examination of asynchronous communication experiences and perspectives of students in an online course: A case study. *The Internet and Higher Education*, 6(1), 77–90. doi:10.1016/S1096-7516(02)00164-1
- Whelan, R. (2008). Use of ICT in education in the South Pacific: Findings of the Pacific eLearning Observatory. *Distance Education*, 29(1), 53–70. doi:10.1080/01587910802004845

- Willging, P. A., & Johnson, S. D. (2009). Factors that influence students' decision to drop out of online courses. *Journal of Asynchronous Learning Networks*, 13(3), 115–127.
- Woods, R. H., & Baker, J. D. (2004). Interaction and immediacy in online learning. *The International Review of Research in Open and Distance Learning*, 5(2).
- Wu, J. H., Tennyson, R. D., & Hsia, T. L. (2010). A study of student satisfaction in a blended e-learning system environment. *Computer & Education*, 55(1), 155–164. doi:10.1016/j.compedu.2009.12.012
- Zepke, N., & Leach, L. (2006) Improving learner outcomes in lifelong education: Formal pedagogies in non-formal learning contexts? *International Journal of Lifelong Education*, 25(5), 507–518. doi:10.1080/02601370600912089

Appendix

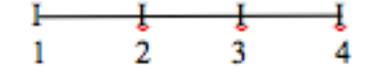
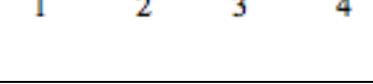
Questionnaire

Age:

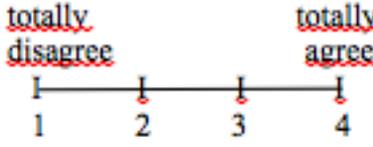
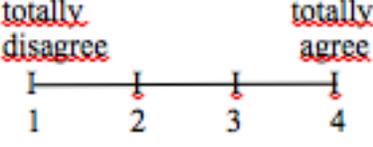
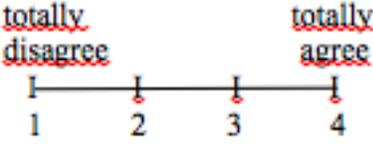
Sex:

Nationality:

1. Did any psychological factor create a barrier in the virtual communication (interests, temperament, rivalries, skills mastered ...)?	<p style="text-align: center;"> <u>totally disagree</u> <u>totally agree</u>  </p>
2. Did any technical factor create a barrier in the virtual communication (Internet connection, quality of transmission...)?	<p style="text-align: center;"> <u>totally disagree</u> <u>totally agree</u>  </p>
3. Did any sociological factor create a barrier in the virtual communication (ideological, cultural, religious conception ...)?	<p style="text-align: center;"> <u>totally disagree</u> <u>totally agree</u>  </p>
4. Did any cognitive factor create a barrier in the virtual communication (prior knowledge, mastery of online communication ...)?	<p style="text-align: center;"> <u>totally disagree</u> <u>totally agree</u>  </p>
5. The course was well designed.	<p style="text-align: center;"> <u>totally disagree</u> <u>totally agree</u>  </p>

6. The topics covered were appropriate.	<p style="text-align: center;"> <u>totally disagree</u> <u>totally agree</u>  1 2 3 4 </p>
7. The course was well organized.	<p style="text-align: center;"> <u>totally disagree</u> <u>totally agree</u>  1 2 3 4 </p>
8. There were enough participants.	<p style="text-align: center;"> <u>totally disagree</u> <u>totally agree</u>  1 2 3 4 </p>
9. The course was long enough.	<p style="text-align: center;"> <u>totally disagree</u> <u>totally agree</u>  1 2 3 4 </p>
10. The course contents were appropriate for the course.	<p style="text-align: center;"> <u>totally disagree</u> <u>totally agree</u>  1 2 3 4 </p>
11. The resources were appropriate.	<p style="text-align: center;"> <u>totally disagree</u> <u>totally agree</u>  1 2 3 4 </p>
12. I had the opportunity to participate (express opinions, evaluate ...).	<p style="text-align: center;"> <u>totally disagree</u> <u>totally agree</u>  1 2 3 4 </p>
13. I felt involved in the course.	

	<p>totally disagree totally agree</p> <p>1 2 3 4</p>
14. The professors in the course fulfilled my expectations.	<p>totally disagree totally agree</p> <p>1 2 3 4</p>
15. I think the professors maintained a positive attitude.	<p>totally disagree totally agree</p> <p>1 2 3 4</p>
16. The professors monitored my participation.	<p>totally disagree totally agree</p> <p>1 2 3 4</p>
17. The professors solved any technical problems that arose correctly.	<p>totally disagree totally agree</p> <p>1 2 3 4</p>
18. I felt comfortable with my classmates and the professors in the course.	<p>totally disagree totally agree</p> <p>1 2 3 4</p>
19. I am satisfied with the work of the group as a community.	<p>totally disagree totally agree</p> <p>1 2 3 4</p>

20. I communicated with my classmates outside the platform.	
21. The conclusions in the shared as a document fulfilled my expectations.	
22. I have a positive impression of the course.	
23. Why are you satisfied or dissatisfied with the course? (open response)	