Mooc & B-learning: Students’ Barriers and Satisfaction in Formal and Non-formal Learning Contexts

Gutiérrez-Santiuste, Elba (Corresponding autor)
University of Granada.
Department of Didactics and School Organization. Faculty of Education Sciences, Campus de Cartuja, s/n, 18071 Granada, Spain.
egutierrez@ugr.es
Phone: (+34) 666 288927 Fax: (+34) 958 248 965

Gámiz-Sánchez, Vanesa-M.
University of Granada.
Department of Didactics and School Organization. Faculty of Education Sciences, Campus de Cartuja, s/n, 18071 Granada, Spain.
vanesa@ugr.es
Phone: (+34) 958 241399

Gutiérrez-Pérez, José.
University of Granada.
Department of Research and Diagnostic Methods in Education. Faculty of Education Sciences, Campus de Cartuja, s/n, 18071 Granada, Spain.
jguti@ugr.es
Phone: (+34) 958 243757
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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 strong and weak points of the two modes, in the hope that each mode may improve or complement the other from the perspective of the other’s scenario.

Keywords: barriers, educational technology, electronic learning, Higher Education, instructional, design, participant satisfaction
**Introduction**

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 et al., 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. The Organisation for Economic Co-operation and Development (OECD, 2005, p. 5-6) indicates:

- **Formal learning:** It can be achieved when a learner follows a programme of instruction in an educational institution or in the workplace. Formal learning is always recognised 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.

- Informal learning: It results from daily work-related, family or leisure activities. It is not organised or structured (in terms of objectives, time or learning support). Informal learning is in most cases unintentional from the learner’s perspective. It does not lead to certification.

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 strong and weak points of the experiences, in the hope that each mode may improve or complement the other from the perspective of the other’s scenario.

**Background**

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. A first level is related to the barriers encountered by institutions. Birch and
Burnett (2009), for example, analyze strategic planning, the absence of institutional policies, and the cost of implementation.

A 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 fulfill expectations, professional development, culture, inconsistency between the technology, and pedagogical beliefs are also mentioned (Veletsianos, Kimmons & French, 2013).

A 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. The study by Simuth and Sarmany-Schuller (2012) finds, however, that students do not perceive technology as a barrier in their online courses.

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, as Hammond, Reynolds and Ingram (2011) indicate, the feeling of self-efficacy in using ICTs. The study by Muilenburg and Berge (2005) establishes 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.
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). Hillage and Aston (2001) indicate three groups of obstacles: attitudinal, physical and material, and structural. Longworth (2003) also lists the following: mental barriers (related to one’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). 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 collects the contributions of Kop et al. (2011) that indicate barriers to learning wee time zone and language differences, chaotic course structure, connecting with others in different spaces, skills in the use of tools, power relations and personnel reasons. Also Fini (2009) notes as barriers technological skills and time constraints.

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. A study by Cutler (1995) finds that, the more personal information is disclosed, the more reciprocity is produced, the more trust is established, and the more students both seek support and experience increased satisfaction. Gunawardena and Zittle (1997) and Rourke, Anderson,
Garrison and Archer (1999) argue that effective social presence is a predictor of the degree of satisfaction among online students. Subsequent studies have investigated other motives. The study by Mason and Weller (2000) finds that factors determining satisfaction with the course are abilities relative to content (search for and management and creation of information), prior experience with technology, and support from mentors and other administrative personnel, as well as the extent to which the content and presentation meet students’ expectations. Gunawardena and Duphorne (2000) find strong correlations between satisfaction and willingness to learn, online functions, and learning focuses; and Kanuka and Nocente (2003) looked for but did not find a relationship between satisfaction and students’ personality.

During these years, in-depth analyses of social issues in virtual courses continued, particularly of their relationship to satisfaction with both peers and professors. Gunawardena (2003) focuses on the fact of social presence in education, indicating that students confirm their satisfaction with this type of education and thus taking into account affective needs in the teaching-learning process. 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 study by Woods and Baker (2004) argues that students see immediacy as a
benefit, since communication provides a greater feeling of psychological closeness, creating a safe and rich interpersonal environment. In analyzing which factors make social communication effective, Richardson and Swan (2003) and Swan and Shih (2005) observe that the most significant factor in student satisfaction is the social presence of the instructor. Swan (2001) also establishes a relationship between satisfaction with the degree of students’ activity and interrelation between classmates. 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. Arbaugh’s 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). 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. Naveh et al. (2010) focus on organizational factors: websites, university policy, size of the course staff, course year and discipline, and course content. 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.
Willging and Johnson (2004) establish a series of factors that cause dissatisfaction in online students and contribute to their dropping out of courses. 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. Cabero et al. (2010) also 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 behavior relative to assessment, difficulty in understanding, and unsuitability of content.

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 to evaluating the complexity of a learning and educational experience (Sax, 2004). Along these lines, some studies approach 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.

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, fully virtual) 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 1:

Table 1. Age range of students

<table>
<thead>
<tr>
<th>Group</th>
<th>Age range (%)</th>
<th>Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;20</td>
<td>20-30</td>
</tr>
</tbody>
</table>

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/informal 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) 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) and LimeSurvey (formal); 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 of 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.
• Mentors: 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 2).

Table 2. Point values for factors

<table>
<thead>
<tr>
<th></th>
<th>Barriers</th>
<th>Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychological Barriers</td>
<td>.839</td>
<td></td>
</tr>
<tr>
<td>Technical/Technological Barriers</td>
<td>.720</td>
<td></td>
</tr>
<tr>
<td>Sociological Barriers</td>
<td>.895</td>
<td></td>
</tr>
<tr>
<td>Cognitive Barriers</td>
<td>.825</td>
<td></td>
</tr>
<tr>
<td>Planning</td>
<td></td>
<td>.626</td>
</tr>
<tr>
<td>Content</td>
<td></td>
<td>.760</td>
</tr>
<tr>
<td>Participation</td>
<td></td>
<td>.687</td>
</tr>
</tbody>
</table>
The reliability of the evaluation instrument was determined using the Alpha Cronbach 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.

**Results**

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

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: “Also, a lot of people throw out ideas without any relation to what was asked for, or they repeat” (Group F).

The qualitative analysis established the variety and type of barrier encountered by the students in their online courses. The quantitative analysis enabled us to determine the magnitude and seriousness of the obstacles that the students perceived in the two modes of learning, F and NF.
We found differences between Groups F and NF in the barriers that students encountered.

Table 3. Sample statistics

<table>
<thead>
<tr>
<th></th>
<th>Group</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Mean Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychological barriers</td>
<td>F</td>
<td>1.45</td>
<td>.84</td>
<td>.10</td>
</tr>
<tr>
<td></td>
<td>NF</td>
<td>1.88</td>
<td>.93</td>
<td>.06</td>
</tr>
<tr>
<td>Technical barriers</td>
<td>F</td>
<td>1.91</td>
<td>.99</td>
<td>.12</td>
</tr>
<tr>
<td></td>
<td>NF</td>
<td>2.16</td>
<td>.95</td>
<td>.07</td>
</tr>
<tr>
<td>Sociological barriers</td>
<td>F</td>
<td>1.19</td>
<td>.47</td>
<td>.06</td>
</tr>
<tr>
<td></td>
<td>NF</td>
<td>1.63</td>
<td>.92</td>
<td>.06</td>
</tr>
<tr>
<td>Cognitive barriers</td>
<td>F</td>
<td>1.75</td>
<td>.80</td>
<td>.10</td>
</tr>
<tr>
<td></td>
<td>NF</td>
<td>2.06</td>
<td>.99</td>
<td>.07</td>
</tr>
</tbody>
</table>

Table 3 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 4:

Table 4. Contrast of means in Groups F and NF

<table>
<thead>
<tr>
<th></th>
<th>Levene</th>
<th>Mann-Whitney</th>
<th>Kolmogorov-Smirnov</th>
<th>Cohen’s d</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sig.</td>
<td>Z Asymp. Sig.</td>
<td>Z Asymp. Sig.</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2 tailed)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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 H0 in favor of Ha. 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 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 also identify sociological barriers, and in this case we find differences between Groups F and NF. The students express a lower percentage of psychological than of technical barriers, and there are differences between the two groups. The obstacles least expressed by the students are cognitive, and we find differences between the two groups.

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 format
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 referred more often to their reasons for dissatisfaction. The reasons for satisfaction in Group F involve creation of community in the virtual course, planning, and design. 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 and design. Group NF also expressed its dissatisfaction with assessment, design, and planning. In Group F, the reason most often expressed related to design, followed by planning. 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).

The analysis of the quantitative data from the questionnaire on satisfaction is shown in Table 5:

Table 5. Statistics for satisfaction according to learning format

<table>
<thead>
<tr>
<th></th>
<th>Group</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall assessment</td>
<td>F</td>
<td>3.79</td>
<td>.48</td>
<td>.06</td>
</tr>
<tr>
<td></td>
<td>NF</td>
<td>3.72</td>
<td>.45</td>
<td>.03</td>
</tr>
<tr>
<td>Conclusions</td>
<td>F</td>
<td>3.40</td>
<td>.66</td>
<td>.08</td>
</tr>
<tr>
<td></td>
<td>NF</td>
<td>3.39</td>
<td>.50</td>
<td>.03</td>
</tr>
<tr>
<td>Planning</td>
<td>F</td>
<td>3.67</td>
<td>.50</td>
<td>.06</td>
</tr>
<tr>
<td></td>
<td>NF</td>
<td>3.38</td>
<td>.51</td>
<td>.03</td>
</tr>
<tr>
<td>Content</td>
<td>F</td>
<td>3.80</td>
<td>.28</td>
<td>.03</td>
</tr>
<tr>
<td></td>
<td>NF</td>
<td>3.37</td>
<td>.56</td>
<td>.04</td>
</tr>
<tr>
<td>Participation</td>
<td>F</td>
<td>3.62</td>
<td>.69</td>
<td>.08</td>
</tr>
<tr>
<td></td>
<td>NF</td>
<td>3.50</td>
<td>.52</td>
<td>.03</td>
</tr>
<tr>
<td>Mentors</td>
<td>F</td>
<td>3.70</td>
<td>.33</td>
<td>.04</td>
</tr>
</tbody>
</table>
The students in both Group F and Group NF were highly satisfied \( (\text{min} = 3.24; \text{max} = 3.80) \), although the means are slightly higher in Group F.

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 6. Contrast of means and magnitude of difference between Groups F and NF

<table>
<thead>
<tr>
<th></th>
<th>Levene</th>
<th>Mann-Whitney</th>
<th>Kolmogorov-Smirnov</th>
<th>Cohen’s d</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sig. (2 tailed)</td>
<td>Z</td>
<td>Asymp. Sig.</td>
<td>Z</td>
</tr>
<tr>
<td>Overall assessment</td>
<td>.31</td>
<td>.350</td>
<td>-3.02</td>
<td>.003</td>
</tr>
<tr>
<td>Conclusions</td>
<td>19.17</td>
<td>.904</td>
<td>-.29</td>
<td>.767</td>
</tr>
<tr>
<td>Planning</td>
<td>.38</td>
<td>.000</td>
<td>-3.72</td>
<td>.000</td>
</tr>
<tr>
<td>Content</td>
<td>28.25</td>
<td>.000</td>
<td>-5.40</td>
<td>.000</td>
</tr>
<tr>
<td>Participation</td>
<td>.06</td>
<td>.170</td>
<td>-2.45</td>
<td>.014</td>
</tr>
<tr>
<td>Mentors</td>
<td>7.50</td>
<td>.000</td>
<td>-5.11</td>
<td>.000</td>
</tr>
<tr>
<td>Community</td>
<td>.77</td>
<td>.000</td>
<td>-5.31</td>
<td>.000</td>
</tr>
</tbody>
</table>
By contrasting the results of the analyses presented in Table 6, 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, Mentors, 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.

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, mentors, 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 virtual learning (MOOC and b-learning) as they relate to barriers and student satisfaction. Our main goal was to find possibilities for complementarity between the two methodologies, formal and non-formal learning, which, along the lines explained in Bruff et al. (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, it is technical problems that cause the greatest difficulties in dealing with a virtual experience in both modes. These are barriers 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 Muilenburg 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 NF course give more general reasons for arguing their satisfaction and express their dissatisfaction primarily with planning, design, and assessment. Student dissatisfaction of in the formal course 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 experience. From the data gathered in the questionnaire, it is worth noting the differences that occur between one experience and the other regarding satisfaction with content, mentors, community, and planning. As stated above, creating community seems to be one of the main points of divergence, as well as mentoring, which is much more direct and personalized in the online course than in the massive courses and thus takes on a more energizing role. This result could indicate a relationship between satisfaction and the number of students in an online 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., 2000; 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, factors that could be determining and that should be explored in future studies.

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**Authors’ Bios**

**Elba Gutiérrez-Santiuste** is Associate Professor in Universidad Internacional de la Rioja. PhD in Education from the University of Granada (Spain) and PhD in Education from Tor
Vergata University (Rome, Italy). Master in Research and Innovation in Curriculum and Teacher Training. Online education specialist. E-mail: egutierrez@ugr.es

Vanesa M. Gámiz-Sánchez is Professor in the Department of Didactics and School Organization of the University of Granada, Spain. She received her PhD from University of Granada and she has published in the field of educational technology and e-learning.

José Gutiérrez-Pérez is Chair Professor in the Department of Research Methods and Educational Diagnosis of the University of Granada, Spain. He is responsible for the area for University Evaluation and Accreditation of the Directorate for Evaluation and Accreditation of the Andalusian Agency of Knowledge and Director of the Research Group on Environmental and Institutional Evaluation.