Scope and Limitations of Open Assessment: An ICT-Based Case Study

A. Chiappe, R. A. Pinto and V. M. Arias

Abstract—**This article describes the results of a study that presents open assessment as an innovative educational practice mediated by information and communications technology (ICT). In addition, it describes the implementation of an open assessment experience in higher education as a case study.**

The results show that open assessment is accepted well by students due to the adaptability and flexibility of the time and place of testing, and it has been possible to demonstrate that the responsibility and maturity of the students play important roles in improving the learning process as a part of this type of evaluation, which makes it formative in nature.

Index Terms—**Open educational practices, open assessment, open educational resources, learning environment, e-learning.**

I. INTRODUCTION

THE integration of information and communications technology (ICT) with education is a growing international phenomenon that has gathered so much momentum that it is currently considered a structural element of institutional policies and dynamics at all educational levels [1].

Therefore, UNESCO insists that ICT plays a fundamental role in education by offering educators the necessary tools to creatively impact the processes of teaching and learning, which allows them to overcome the challenges of a changing global environment that are disruptive to knowledge-based societies [2].

Of the current trends in education, the one that is emerging and growing the fastest within the framework of integrating ICT into education is known as the open education movement. This movement promotes reflection and criticism relating to the use of open educational resources (OERs) and formative experiences (or educational practices) based on "open" attributes such as free access, reuse, remixing, collaboration, sharing, etc. that particularly characterize these processes and make them suitable for online educational contexts, which are becoming more global and social as they change [3].

In this context, the open education movement develops on the basis of OERs and open educational practices (OEPs), which, in an articulated manner, comprise all educational practices.

Ehlers and Conole [4] consider open educational practices to go beyond simple use of OERs when they say,

"[P]ractices which support the (re) use and production of high quality OER through institutional policies, promote innovative pedagogical models, and respect and empower learners as co-producers on their lifelong learning path" [4].

One of the educational practices that is most debated and most criticized by different education-related sectors and actors is assessment. This is because it is a process that affects not only student´s learning (when assessment is formative) but also promotion and certification processes.

Students who grow up in a knowledge-based society demand that what they learn in the educational process be significant and applicable [5]. However, it is important to note that the educational assessment systems that are "typically" used in higher education are traditional and summative; they rarely use ICT-based educational resources and do not verify the that student's learning process continues beyond simply measuring the topics approached [6].

Taking this into consideration, an investigative process that focuses on identifying the scope and limitations of this educational practice when it is designed and implemented openly was designed. This study was planned as an eminently qualitative process in the form of a case study framed by the teaching of telecommunications engineering at a private university in Colombia.

For the purposes of this study, open learning assessment is considered "the process of verification and feedback of collaborative learning, measured using open access tools, in which professors produce or adapt evaluative resources and students adapt and remix these resources to generate for themselves an evaluation that responds to their personal and contextual needs" [7].

In the following sections, we describe the proposed methodology of the study, including its phases, categories, analytical procedures, and data collection instruments.

The results section describes the main findings in the different analytical categories proposed, starting from the identified scope and limitations of open learning assessment.

Finally, in the conclusion, we propose possible responses to the research questions that initiated this investigative process.

II. METHODOLOGY

For this study, we designed and implemented an open assessment experience in which 30 students of telecommunications engineering at the Universidad Piloto de Colombia (UPC) participated for 13 weeks.

Due to the diversity of the participating students, the type of sample most suitable for this study was a non-probabilistic intentional sample, which made it possible to enrich the data by allowing students with very different characteristics to participate. A very diverse group was composed by men and women who were both older and younger than the mean age of students in the course (23 years) and who had the following characteristics: non-repeating and non-working, repeating and non-working, repeating and working, and finally, non-

repeating and working. The term "non-working" refers to full-time students.

In addition, the characteristics of "openness" applied to the assessment processes and instruments used in this experience were: free access, adaptation, remixing, and collaboration.

To complete the proposed case study and to ensure the quality and objectivity of the research, we used the vision of case studies of George and Bennett [8], who indicate that this type of study can be conducted in three phases:

- Preparation and design.
- Implementation and fieldwork.
- Analysis and conclusions.

Figure 1 shows the diagram of the process followed in the study.

Figure 1: Method diagram
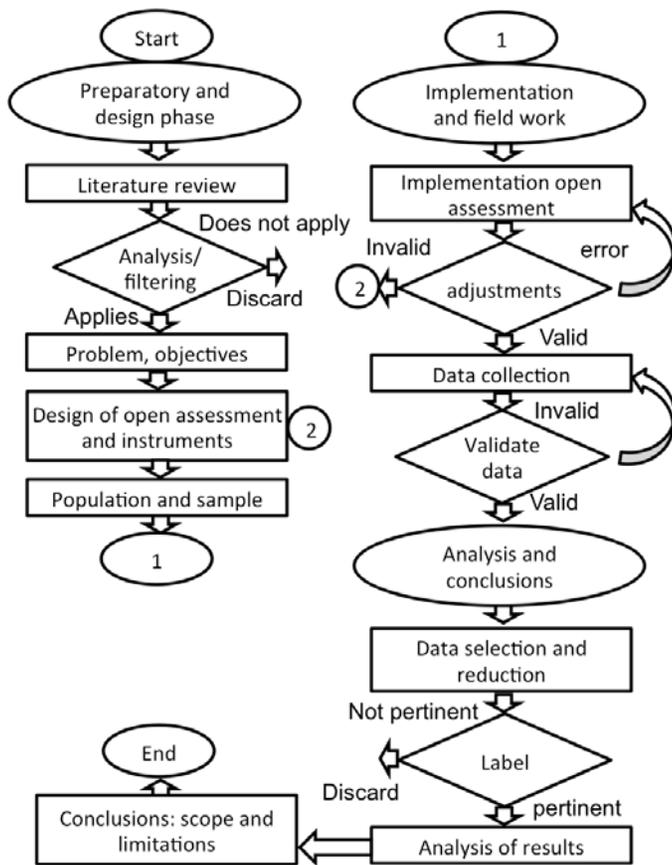
The analysis categories used include the attributes of openness in addition to two other categories relating to the assessment process: 1) the typology of the actors who intervene in the assessment process (students and teachers) and 2) the external variables that influence the assessment.

The type and quantity of the instruments used addressed the necessity of triangulating the observations documented in the field journal, with the end of promoting the consistency and reliability of the results of the experience and minimizing the error due to differences between observers. According to Cabrera [9], triangulation is the process of cross-verifying information to strengthen the validity of the analysis.

The first instrument used was a semi-structured interview with 20 questions; it was used with 10% of the participating students. Because it was considered important to enrich the sample, two older professors with more than ten years of experience and two newer professors with fewer than three years of continuous work experience were selected. Figure 2 shows the responses to one of the questions about students' conceptions of open assessment that was asked in the interview.

Figure 2: Interview results for the question: What is open assessment?
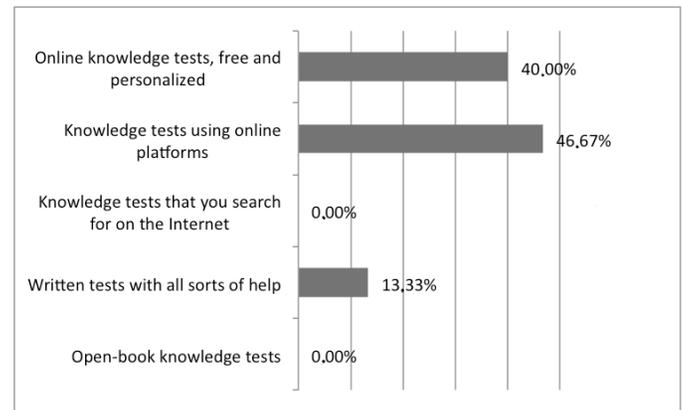
A second instrument used for data collection was the field journal, which documented continuous observation of the open assessment process.

Once the open assessment experience was finalized, a survey with 24 questions about three specific issues, the general learning environment, the open assessment experience, and the resulting learning, was distributed. Three complementary questions about teachers and the educational institution were also asked.

For triangulation, we conducted a collective interview (focus group) of the participating students when the academic period was over.

The data were analyzed using ATLAS.ti, a qualitative data analysis (QDA) application that is broadly used in studies of education [10]. This process started with the random selection and posterior analysis of eight primary documents (PDs), from which 235 quotations or text segments that were relevant and corresponded to the expected categories of analysis were chosen. The quotations were labeled with keywords to identify them in the analysis. There were 72 labels, which were filtered and placed into a hierarchy to create three large superlabels corresponding to categories of the analysis that were related to the assessment process.

Figure 3 shows an excerpt from the distribution of the labels with the highest density (frequency/total labels) found in the analysis with ATLAS.ti. This list was used in the classification of the superlabels and the categories that emerged from the analysis.

Figure 3: List of labels and superlabels.

The data collected from the quotations and text segments demonstrated common aspects, agreements, similarities, disagreements, and antagonistic situations expressed by the protagonists. Because of this, it was necessary to compare that information using triangulation.

Figure 4 shows part of the list of quotations from the different PDs sorted by frequency.

Figure 4: List of labeled quotations by frequency

This qualitative process, which was accompanied by a basic descriptive and correlation-based statistical process, allowed us to define more clearly the intentions and positions of each of the participants and facilitated the analysis of the results.

III. RESULTS

Below, we describe the study's findings in each of the categories of analysis:

A. Scope and limitations of free access

This attribute of open assessment refers to the opportunity that students and teachers have to access the different resources used in the evaluation (whenever and wherever they chose).

All (100%) of the participating professors considered free access to content, evaluative instruments, and platforms helpful with the elaboration of the evaluative components of their courses because it enables them to use resources that have already been validated through other teachers' experiences, which enriches their perspective of the evaluation process.

In addition, 75% of the participating professors considered open assessment an opportunity to make themselves visible before the global educational community by sharing these freely developed OERs and by moving from being merely a consumer of the content and tools created by others to being a producer of educational resources for evaluating learning.

In addition, we found agreement between what the professors expressed about free access and the responses of 70% of the students to the final survey's questions about the freedom to learn about and reinforce diverse topics that interest them and the opportunity to evaluate themselves without restrictions on time and place. In that context, the free access an attribute of "openness" showed a high correlation $(r=0.78)$ and was a key factor in the success of this type of assessment practice for both professors and students. Nevertheless, although the literature recognizes them as elements of free access, the same does not appear to be true of the possibility of participating in the production of knowledge or of space/time flexibility ($r=0.26$ and $r=0.31$, respectively).

B. Scope and limitations of collaboration

This attribute of open assessment describes assessment as teamwork in which common results are obtained during the acquisition of knowledge and converted into a more formative process.

Approximately 50% of the professors indicated that the collaborative part of the assessment strengthened the training of the student by complementing knowledge and clarifying gaps without regard to the sources or the methods of students.

In addition, 50% of the professors thought that collaborative assessments should be complemented by individual assessments to avoid biases and prejudiced deviations due to students who are not very dedicated to learning.

In this sense, the professor identified as P3HB responded: "I would think yes. Evaluation can be collaborative but not exclusively collaborative and in groups. I think that there should be a part of the evaluation that has to be personal and individual, as people are, individual and different."

A total of 75% of the professors also showed a certain level of apprehension about the possibility that this form of assessment could be a veiled form of copying and cheating by the students, as indicated by the professor identified as P5GV:

"[T]he problem would be that because he can do it at any time, in any place, maybe another person is answering for

him."

With regard to the above, some students commented:

"It helped all of us complement our learning to have some feedback from the professor and our classmates because it was a group evaluation where all of us could give our opinions, where all of us could give our perspectives on an answer."

The collaborative or group assessment produced feelings of acceptance, interest, and relevance in 100% of the students, as shown by the following excerpt from interview 7:

"But this type of assessment commits the student to learning to a greater extent and [requires] that the student be more in contact with the professor, who can dismiss doubts and be in constant feedback, to always be able to be in contact with the professor, which is important for one to learn about the course that one is going to take."

C. Scope and limitations of remixing

According to Chiappe [7], from a student´s perspective, remixing the assessment consists of using assessment resources developed or adapted by the professors and from free repositories to generate for him- or herself "an assessment that responds to his/her personal needs and context." In this sense, the student can independently adapt and choose the means, the structure, and the timing of his or her assessment based on the availability of assessment instruments.

For this to happen, it is necessary for these resources to be available online to students using ICT. For the purpose of this study, some instruments were developed (games) and others were adapted (questionnaires) to make them available to students at two different times. The student could freely "choose" among various alternatives to perform the assessment within certain constraints on the number of instruments selected, the number of times he or she could change them, and the time allowed for him or her to respond.

It is important to note that applying this attribute of openness to the assessment met with resistance from 25% of the professors, as shown in the following excerpt from an interview:

"That is, it should seem valuable to me, right? But the student cannot choose everything. Because if so, let's say, you couldn't or the student couldn't answer some fundamental precepts of the curriculum. The curriculum could become anything."

In contrast, 70% of the students viewed this form of assessment more favorably. They warned that a good selection of assessment instruments is necessary.

The correlations found for this category showed that professors and students had different interests. In fact, the correlation coefficients found for three characteristics of remixing ("choosing," "personalizing," and "deciding") were moderately inverted ($r=-0.65$, $r=-0.58$, and $r=-0.51$, respectively).

An interesting issue identified from the instruments used with the students is that, when asked to choose, 75% of the students preferred exercises or questions that they understand or knew best, thereby making it impossible to measure their

understanding of certain more complex or more difficult topics; nevertheless, this is also considered an opportunity to identify gaps in their learning.

D. Scope and limitations of adaptation

This attribute of open assessment was analyzed on the basis of the opportunity to use assessment resources and tools that were designed to be modified and freely adapted by other users, including teachers and students. To achieve this, professors must be willing to develop these resources in ways that allow them to be adapted and to place them in repositories of OERs.

Of the professors, 50% considered adapting educational assessment resources that they find in open access sites online a good method for improving the assessment process as long as those instruments are up-to-date and easily adaptable, that is, that updating them does not require complex procedures and technical knowledge.

Despite recognizing the positive aspects of adaptation, 100% of the participating professors indicated that the lack of time to develop open resources that can be shared with other professors is a significant limitation.

One notable aspect is that although the open nature of this type of assessment empowers learners in the assessment process, the conception of the professor's advantage in the dominion of the process persists.

Comments such as the following exemplify this situation:

"Yes, as long as the professor influences [it], in the sense that he or she generates doubts and brings to light the doubts of the students."

"[I]t could be that there is a bank or a directory where certain types of assessments are, but it depends on the contents he develops. It could be that an adapted assessment does not correspond to the content he develops, and it does not delve into the specifics of his course."

E. Scope and limitations of the characteristics of the actors who participate in the open assessment process

The analysis of some of the characteristics of the participating students showed that there is a notable correlation between the results of the assessment and two key demographic factors for this study: age and time dedicated to study ($r=0.71$ and $r=0.87$, respectively). Therefore, despite the possibilities and flexibility of the open assessment process, it did not have a significant positive effect on working students, who historically miss or cancel up to 80% of the classes. In accordance with the results, five of the 10 working students who participated in the study failed the assessment.

These working students were older than the mean age of the students in the course (they were between 25 and 28 years old) and decided to enroll in the course when they were already at higher levels in their studies. The younger students did not work, and 83% of them passed the course.

Even so, as shown in Figure 5, the results of the interviews showed that 70% of the students welcomed the

implementation of open assessment. The professors, however, had a lower acceptance rate (60%), with the older and more experienced professors not seeing much educational value in it.

Figure 5: Study findings according to the categories of the analysis.
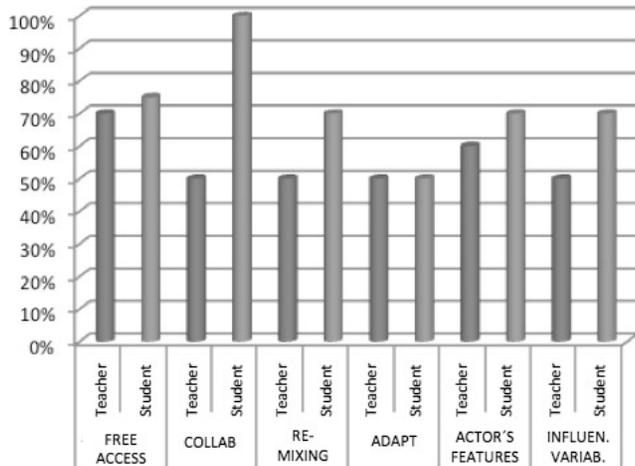
F. Scope and limitations of the variables that influence the implementation of open assessment

This category of analysis emerged after a second labeling of the data collected using the instruments. The high frequency of commonalities in these data (139 data points, which were associated with or dependent on 40 labels) indicated issues that those interviewed thought were important for making the assessment open. These issues were classified and organized as superlabels or subcategories. The most frequently co-occurring labels were educational and technological competencies for both students and professors, and the use of OERs was second. In general, the answers given in the interviews showed that approximately 50 % of the professors indicated difficulties with introducing open assessment in their courses, while the students demonstrated an acceptance rate of close to 70%.

Below, we highlight the most relevant aspects of each of these two subcategories.

Educational and technological competencies

We identified and selected 32 data points from the results collected using different instruments. At these points, students considered various aspects that were relevant to their and the professors' educational and technological competencies in the learning process. The first identified had to do with the small number of courses or learning experiences in the program in which the professors used ICT to foster the learning process.

An example of this was extracted from the interview with the student identified as "S":

"One expects to use these tools more; honestly, I've only encountered these tools in the second semester... and not again until now, when I'm looking at this course."

Open educational resources

This subcategory was focused on the availability, ease of use, and other characteristics of the educational resources used in the open assessment process from the perspectives of both the students and the professors. We selected 38 data points that were associated with or dependent on 14 labels.

From the students' perspective, appreciation of this variable was found at 50% of the selected data points. This result reflects important considerations regarding the resources and ICT tools used in their classes and was synthesized into three key aspects: space/time flexibility, autonomy, and variety.

In addition, we found that open assessment requires the students to have high levels of responsibility, discipline, and concentration to achieve the objectives. The student identified as "AL" mentioned this in the same forum:

"Current virtual learning platforms demand a lot of discipline and responsibility of the student; they depend a lot on self-teaching capacity."

Finally, students consistently recognized that the use of OERs incorporates elements of variety into the assessment process in the use of both different formats and different methods.

However, the professors' perspective on the use of OERs to assess learning revolves around a permanent tension between the potential of the OERs and the professors' comfort zone, which is represented by in-person contact (associated with tradition), as the setting for the development of assessment processes.

As mentioned previously, the majority of the professors find ICT helpful in the educational process, as long as in-person contact does not disappear, because for them the figure of the professor is indispensable to the process: they emphasize the importance of ICT for introducing learning assessment permanently.

IV. CONCLUSIONS

One characteristic that is particular to and generalized within engineering education has been a noted adherence to traditional teaching and assessment plans. The traditional assessment that has been used with students in the courses that make up the telecommunications engineering program of the UPC is far from formative and therefore has shown shortcomings in its ability to promote significant student learning. In these circumstances, we found it pertinent to explore new forms of assessment that could correct the rigidity of traditional assessment and that would offer students a fresh and flexible panorama for assessing their learning.

In this context, the benefits of making assessment open are recognized; these include, in particular, free access to information and the opportunity for the student to remix the

assessment instruments, which personalizes the assessment process.

In this sense, it was shown that the collaborative component of open assessment increased the students' learning by reinforcing the mutual trust brought about by group work by allowing the possibility of interaction as students calmly approached questions relating to their understanding of some complex topics.

However, despite evidence for the contributions of "openness" to the assessment process, it is necessary to recognize that its limitations are largely due to the profound interiorization of elements associated with traditional assessment methods. The majority of students were afraid because collaborative work during an assessment is strongly associated with "copying" or "cheating."

However, although both professors and students recognized that the open assessment process generated positive results in terms of student learning, the inconvenience of translating the results of the assessment into numerical grades remained. The current equivalence of evaluation with a student's promotion to a higher grade deviates from the educational intentions that assessments should have because it prompts students to achieve results that do not necessarily reflect their learning but allow them to advance in their studies.

It is important to mention that the effect of collaboration as an attribute of "openness" on the assessment process is in agreement with the results obtained by López, Martínez, and Julián [13] in the sense that a more open and shared assessment process motivates students, encourages them to be responsible and autonomous, improves their performance, and develops their metacognitive activities.

With regard to the possibility of remixing in the open assessment process, that is, offering students the opportunity to create their own assessments from a variety of available educational resources designed or planned by the professor, a notable outcome is the students' acceptance of this attribute and the improvement in their grades. In addition to allowing them to take steps to reach a higher level with flexibility in terms of time and space, remixing made it possible for students to tailor the assessment activity to their learning styles, which improved their motivation and self-esteem, which are key factors for learning in general.

Finally, it is important to note that although the mean grades of the last two groups of participating students who passed the course increased, it is necessary to implement other complementary processes to verify that the students learned the course's content and to identify and reduce biases, if they exist, resulting from the application of the various attributes of "openness" to the assessment process.

To promote a deeper understanding of the reach of open assessment, we recommend that the number of open evaluations be greater than that of traditional evaluations and that the learning of the students taking advantage of these different opportunities be continuously followed when feedback is given.

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Andres Chiappe became a specialist in research and higher education teaching at Universidad Autónoma de Manizales in 1997 and received a master's degree in Educational Technology at the Instituto Tecnológico y de Estudios Superiores de Monterrey in 2002 and a doctorate in education from Universidad de Caldas in 2012. He is currently an Associate Professor and a member of the research group "Technologies for Academia – Proventus" at the Technology Center for the Academy at Universidad de La Sabana in Colombia.
(email: andres.chiappe@unisabana.edu.co)

Ricardo Pinto became an electronic engineer at Universidad Antonio Nariño in Bogota in 1994, a specialist in project management engineering at Universidad Santo Tomas in Bogota in 2002, a specialist in higher education teaching at Universidad Piloto de Colombia in 2010, and a candidate for a master's degree

in educational technology at Universidad de La Sabana in 2015. He is currently a teacher and researcher at Universidad Piloto de Colombia. (email: ricardo-pinto@unipiloto.edu.co)

Vivian Arias became a biomedical engineer at Universidad Antonio Nariño in Bogota in 2000 and received her master's degree in educational technology at la Universidad de La Sabana in 2013. She is currently a professor at the Technology Center for the Academy at Universidad de La Sabana in Colombia.
(email: vivian.arias@unisabana.edu.co)