

Engaging students in the evaluation process using co-creation and technology enhanced learning (CC-TEL)

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Abstract. Evaluating is a complex procedure, especially in education. The main aspect of assessment, according to some studies and Portuguese law, should be formative assessment, helping the student and the teacher evaluate and adapt the process to promote educative success. Classic methods have the teacher as creator of the quizzes and tests that the students resolve along the school year, and use those to ascertain the knowledge attained. That distances students from the evaluation process and from becoming engaged in their own success. This case study used co-creation of the quizzes and tests using learning enhancing software like Kahoot! and self-evaluation using shared e-docs, to bring the student to the center stage of the assessment process and giving the teacher another set of tools to assess the knowledge obtained by the student, as well as providing him new data and feedback to evaluate his teaching practice. The gamification of part of the education process using technology as the focus and enhancer, engaged the diverse partners in a more regulated assessment procedure, leaning to more self-conscious and self-critic students, involved in several parts of their own evaluation.

Keywords: Co-creation, E-docs, Evaluation, Kahoot!, Self-evaluation, Test.

1 Introduction

1.1 Rationale

The procedure of evaluation is a multifaceted one, and one that can have the same amount of subjectivity and objectivity depending on the framework, especially when evaluating education, a process that is complex and polysemic, with multiple orientations and definitions [7]. The works on the subject are interspersed by philosophical aspects and sociological, ethical, psychological and didactic issues.

In the Portuguese law [5, 6] the evaluation process is defined as focusing on the learning developed by the students, with reference to the curricular documents in existence. The evaluation has a continuous and systematic approach and provides the teacher, the student and the other participants in the process with information on the

development of the work, in order to allow the revision and improvement of the teaching and learning process.

Co-creation is a method first applied to management and marketing and can be defined by the creation of value by the company and the customer [13, 14]. This concept has also been the subject of studies, especially in higher education, as a method to increase value in the learning experience.

1.2 Evaluation in Portugal

Portuguese framework states that formative evaluation should be the main evaluation modality and integrates the process of teaching and learning development, as present in Despacho normativo n° 1-F/ 2016 [6].

The procedures to be adopted in this evaluation modality should privilege: a) The regulation of teaching and learning through the collection of information that allows us to know the way we teach and how to learning, grounding the adoption and adjustment of measures and pedagogical strategies; b) The continuous and systematic nature of the evaluation processes and their adaptation to the contexts in which they occur; (c) the diversity of forms of information collection through the use of different assessment techniques and instruments, for the purposes that govern them.

The Decreto-Lei n.° 55/2018 [5] adds that the formative evaluation is key to obtain privileged and systematic information related to the different curricular domains and should involve the students in the process of self-regulating their learning.

1.3 Formative assessment

The essential feature of formative evaluation is that it is integrated into the learning process to contribute to its improvement, letting the teacher know "the conditions in which this learning is taking place" [10] and "instructing the learner on his own course, his successes and his difficulties ". According to Hadji [10], the formative evaluation has four characteristics: safety, which consolidates the learner's confidence in himself; The assistance, which marks the steps and gives points of support to progress; feedback, which gives as soon as possible, useful information on the stages overdue and the difficulties found; and dialogue, which feeds true communication between teacher / learner based on accurate data.

Hadji [10] further adds that to be formative, the assessment should include three functions: the regulatory function, which "allows students to adjust their strategies and teacher to adapt his pedagogical device "; reinforcing function, which aims to competences that are in line with what is corrective function, which should enable the student to recognize and correct their own mistakes.

1.4 Self-assessment

Self-assessment is a valuable learning tool as well as part of an ideal formative assessment process. Formative assessment demands feedback [2], yet most students get little informative feedback on their work [17]. This lack of feedback results from time

constrains on the part of the teachers to give constant feedback on the work the students develops.

Self-assessment is a key element in formative assessment because it involves students in thinking about the quality of their own work, rather than relying on their teacher as the sole source of evaluative judgments [2].

Ross [17] recommended the following:

1. define the criteria by which students assess their work,
2. teach students how to apply the criteria,
3. give students feedback on their self-assessments, and
4. give students help in using self-assessment data to improve performance.

Andrade and Valtcheva [1] add two additional recommendations:

1. provide sufficient time for revision after self-assessment, and
2. do not turn self-assessment into self-evaluation by counting it toward a grade.

Under these conditions, criteria-referenced self-assessment can ensure that all students get the kind of feedback they need, when they need it, in order to learn and helps them stay involved and motivated; encourages self-reflection and responsibility for their learning.

1.5 Other considerations

The U.K.'s Education Staff Health Survey indicated 91% of school teachers suffered from stress in the past two years and 74% experienced anxiety; 91% reported excessive workload as the major cause (a 13% increase from the last six years) [18, 19].

Though working conditions and demands can vary from country to country, it seems that if a country has an established educational system then many of its teachers are experiencing burnout [15].

Volume, defined as too much to do and not enough time, is also a result of the teachers centering all the work, responsibilities and the elaboration of processes on them, as a more traditional approach to teaching shows [15].

Teachers have to plan classes, collect materials, do and think on quizzes and tests, do all the evaluation, give timely feedback to the students, register behaviors and work developed, do reports among other things.

1.6 Co-creation in education

Several studies have been made along these last years about the importance and benefits of co-creation in education in several domains – feedback, assessment, curricula development of services.

Kuh [12] shows that student engagement and participation in high impact practices directly improve learning and grades, which indirectly increase retention and degree completion. Similar results have been achieved by Gray [9] in marketing teaching.

Ramsden in his study of United Kingdom high education, proposes that student involvement in quality processes should start by shaping student expectations of their role as responsible partners who are able to take ownership of quality enhancement with staff and engage with them in dialogue about improving assessment, curriculum and teaching [16].

The work of Bovill shows that student engagement in co-creating the curriculum increases satisfaction of both professors and students [3, 4].

So, from these works, we can affirm that co-creation (at least in high education) is a way to engage students, bring better results and/or overall satisfaction to the teacher and the students.

1.7 Study aim

This study used co-creation in the assessment process, in which 12/15 years students created tests and were active collaborators, in a formative perspective and using self-assessment.

In it I was trying to ascertain:

1. If the process of evaluation could be improved by co-creation;
2. If technology enhanced assessment and gamification could be an engager of students, or if they would find it hard to use;
3. If all the process would bring benefits for the teachers' workload or information gained.

2 CC-TEL to enhance the evaluation process

2.1 Research settings-The learning environment

The present study was conducted at the basic education school Jacinto Correia, part of the ESPAMOL school group, in Lagoa in the South of Portugal. This school has around 500 students, from the 5th to the 8th grade (ages 10-15). In this school, each classroom has a computer with internet access and a projector or magic board. There are two computer labs, each with 15 computers, available to be used. There's wi-fi internet available all over the school allowing the use of personal computers, cellphones or tablets.

Each student has a Google account (usually firstname.lastname@esamol.pt), with access to their own email and a computer account which they use to start session in any computer of the school, or to access the wi-fi.

This study was developed in the Science classes with two groups of students - A class with 27 students in 7th grade and 26 in the 8th grade from 2015 till 2017, and C class with 20 students in both 7 and 8th grade - from 2016 till 2018 (Table 1).

Table 1. Distribution of students per school year.

| School year | Students |
|-------------|---|
| 2015/2016 | 7 th A 27 students |
| 2016/2017 | 7 th C, 8 th A 20+26 students |
| 2017/2018 | 8 th C 20 students |

The study focuses on using the technological tools available at school to develop collaborative work that facilitates formative assessment.

2.2 Kahoot!, quizzes, tests and shared documents

Kahoot! is used for educational purposes, having more than 70 million monthly users worldwide [11].

It is a free platform with a strong recreational component that allows you to construct and apply questionnaires (Quiz or Survey) and ask questions to start a discussion. Depending on the objective and whether or not to include some competition, two types of questionnaires can be constructed: Quiz, most used as an evaluation tool and that generates a ranking of students, according to the speed and number of correct answers to the questions raised; Survey that allows answering the same set of questions, without including rankings and not presupposing the existence of correct answers.

In the beginning of the school year the students were introduced to the platform and, with a hands on approach, used it for creating simple quizzes, as well as hosting and playing them. This first contact with the technology allowed them to gain the tools needed for later, as well as clearing doubts and questions with the teacher and with the other students. Tech savvy students were, in fact, the prime factor in the adaptation period of the classes to the program.

At least once a month, the students would go to a computer room, and were divided in groups of four to five.

Using the themes learned in the sciences class in that period as a base (for instance vulcanism or plate tectonics) students would elaborate a Kahoot! quiz with, at least, eight questions.

For each question they would have to input the correct answer and some incorrect ones.

They would do all the research, and could use the schoolbook, their notes and the internet for the elaboration of the questions. Table 2 serves as example of the kind of questions students created.

Table 2. Two example quizzes made by students about paleontology. In bold are represented the correct answers.

| Theme: Paleontology | | Application: 11 May of 2017, Class 7 th C |
|---------------------|--|--|
| Q | Group 1 | Group 2 |
| 1 | The study of fossils is called... a) Archeology. b) Biology. c) Paleontology. d) Excavation. | The scientists that study fossils are called... a) Geologists. b) Archeologists. c) Investigators. d) Paleontologists. |
| 2 | Fossils mainly appear in ... a) Sedimentary rocks. b) Igneous rocks. c) Metamorphic rocks. d) Ice and Ambar. | The definition of fossils is: Preserved remains or traces of animals from a previous age. a) True. b) False. |
| 3 | Fossils are... a) Marks of animals on rocks. | The fossilization process is enhanced by existence of... |

| | | |
|----------|---|--|
| | <p>b) Preserved remains or traces of any once-living being or its activity from a previous geological age. c) Petrified bones of dinosaurs and mammoths when in contact with Ice. d) Hard parts of living beings (bones, teeth, claws, wood, etc.)</p> | <p>a) small sediments and cold environment. b) small sediments and warm environment. c) large sediments and cold environment. d) large sediments and warm environment.</p> |
| 4 | <p>A dinosaur bone is usually fossilized by... a) Petrification. b) Molding. c) Total preservation/true form.</p> | <p>Most fossils exist after the appearance of hard parts in living beings. a) True b) False</p> |
| 5 | <p>Mammoths were fossilized in Ice by... a) Petrification. b) Molding. c) Total preservation/true form.</p> | <p>Ammonite shells usually fossilize by... a) Petrification. b) Molding. c) Total preservation/true form.</p> |
| 6 | <p>Corals fossils are good... a) Age fossils. b) Environmental fossils. c) None of the above.</p> | <p>Ice and Ambar fossilization are common ways to obtain... a) Age fossils. b) Petrified fossils. c) True form fossils. d) Mold fossils.</p> |
| 7 | <p>Trilobites lived in the... a) Pre-Cambrian. b) Paleozoic. c) Mesozoic. d) Cenozoic.</p> | <p>The correct order is... a) Pre-Cambrian, Paleozoic, Cenozoic, Mesozoic. b) Paleozoic, Mesozoic, Pre-Cambrian, Cenozoic. c) Pre-Cambrian, Paleozoic, Mesozoic, Cenozoic. d) Cenozoic, Paleozoic, Pre-Cambrian, Mesozoic.</p> |
| 8 | <p>Dinosaurs lived in the... a) Pre-Cambrian. b) Paleozoic. c) Mesozoic. d) Cenozoic.</p> | <p>The change from the Paleozoic to the Mesozoic is due to... a) Appearance of hard parts in animals. b) Massive extinction of living beings. c) Appearance of human beings.</p> |

Through all this creation time, the teacher would go between the groups, helping them when needed, and through simple observation sheets register the work being done and the relations established.

At the end of the given time for the task (25 minutes) they would, in succession, host their quiz for the other groups to compete (sharing their quiz number).

While the students did so their scores would be recorded in each of the quizzes and an overall winner group would be selected. This kind of game developed both the competitive but also the cooperative work between group members.

Before and after the session, the students would access a shared excel file where they would self-assess the work developed in that class, as well choose the group member that each of them considered the overall best (figure 1).

| A | B | C | D | E | F | G | H |
|--------------------------|------------------------------------|---------------|-------------------------|---------------|----------|-------------------------------------|--------------------------|
| Student: Diogo Fernandes | | Number: 6 | | | | Class: 7 th C | |
| Self assessment | | | | | | | |
| Day | Participation in creating the Quiz | Collaboration | Interest and motivation | Communication | Research | Participation in answering the Quiz | Best member of the group |
| day/month/year | 1 to 5 | 1 to 5 | 1 to 5 | 1 to 5 | 1 to 5 | 1 to 5 | name |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Figure 1: Example of self-assessment excel sheet used by the students.

2.3 Findings, results and observations

There wasn't a noticeable technology gap or registered difficulty by the students to use, build or share the information, especially after being showed how, and having tested the software in a few trial runs. The software was considered by all of them easy to use. Every time students were questioned and reflected on the process, the hardest part of the task to them was choosing and writing the false alternatives for each question.

It was left to the students the organization of each group. There were groups where a clear leader distributed the tasks (one would write on the computer, others would do the questions), where others didn't, and all did every part in collaboration.

These dynamics were discussed with the students, trying to mediate any incompatibilities, if two strong willed students were together, for instance. Generally, there were none, as the students were excited and engaged in the activity (as it was different from traditional evaluation). The group competitiveness sometimes brought some hardships as some students weren't used to losing. Once it lead to one of the students being put on the side as a "weak link". Careful regulation by the teacher and the establishment of additional rules prevented most of the difficulties and promoted a kind of tutoring by the more knowledgeable of the group, trying to obtain success and reach higher scores.

The students diversified the topics of the questions and reached all parts of the curriculum in study. Every time the exercise was made there were repeated questions between the quizzes (as seen in table 2). This gave the teacher feedback on what were the topics the students considered more important.

If a term or idea the teacher considered important didn't show in any of the quizzes, he would ask why it didn't, and usually explain it again and remind them it's importance.

This feedback was important as a regulating tool of the teaching process.

The self-assessment made by the students helped them comprehend better what were the skills they should have and after a few sessions, the workflow was significantly improved.

Peer review of the work done, helped the teacher understand the view the students have of what a good element of the group should do. It was seen that some groups privileged the playing while others the building of the game.

Gamification of the assessment process lead to an increase in engagement and interest by the students on that process and promoted dialogue and co-discussion of themes and terms, leading to a better understanding of the curricula subjects.

Table 3 summarizes the differences between a more traditional approach to quizzing and testing in a formative assessment perspective and CC-TEL approach.

Table 3. Traditional method and TEL method comparison.

| | Traditional | CC-TEL enhanced |
|---|--|--|
| Tests and quizzes | Made by the teacher (or adapted from other sources, like books, online, etc.). | Made by the students in small groups. |
| Metacognition and recognition of the subject | Passive. Focuses on application of skills and interpretation of problems. | Active. Thinking about what they learned, what is important and how to mobilize it. They research doubts and remember the curricula subjects. |
| Feedback | Both the teacher and the students understand what the students know about the topics the teacher considers more important (and that appear in the test). | The teacher understands what the students know, and also what they consider more important. The students have immediate feedback from the quizzes and engage in tutoring (trying to improve the group score). |
| Evaluation | Done by the teacher. | Done by the teacher with the help of the self-assessment made by the students in each step of the process as well the information gathered by the peer review. Co-evaluation. |

The teacher's role changed. From an evaluator, provider and controller of all the processes to a leader, organizer and empowering figure. This change of role, in this experiment, diminished the teacher's workload, mainly because directing work was easier and more personal and pleasing work than bureaucratic work as making papers and grading them.

If in a class with disciplinary problems or severe learning disabilities this approach could potentially not be the best, having to be mixed with a more traditional form.

3 Conclusion

As the generations change, the change of the needs of the students, together with an explosion of the use of technology, to a degree that we can't even imagine today, demanding schools to provide the young, future citizens with skills and capabilities for success in the jobs of tomorrow, and the perseverance needed to survive a vexing stressful world.

Technology enhanced (TE) evaluation in the form of TE formative assessment and self-assessment brings some advantages and some new opportunities, that can be the basis of the school of the future.

By involving the students in that process, co-creating the evaluation methods and characteristics, by developing their self-assessment skills and showing them paths of self-betterment towards the educative success, we are establish rapport with their personal needs and, by feeling constant feedback give them the confidence and the space to feel comfortable when making mistakes, but persisting and evolving in the several skills in demand for their future, as well the knowledge included in the various curricula.

Kahoot! in the case of this study, served as both a motivator and engager – thus the start of the educative process, as a task to be developed in group setting, promoting the learning or reviewing of curricula specific information – the middle of the learning process, as well as a way to test and give meaningful feedback to the students – the middle and end of the process.

As such there is involvement of the students in the whole educative process, assessment and learning in contrast to a more traditional approach where the production of the testing and assessment materials is a process apart from the learning, and one that carries all the responsibility and workload to the teacher (and corresponding stress).

By giving some of that responsibility and workload to the students, the teacher can be a better guide, and reach those that are in his need more often or more tangibly.

By constant addressing group dynamics and promoting cooperative work led to the more knowledgeable students to tutor and mentor the struggling students in and out of class.

The combination of all the data obtained in the process, using the data from the students, the data collected observing, the feedback from the game and questions, this CC-Tel assessment can be interpreted as co-evaluation – looking at the students as partners in this complex process.

Due to the positive results of this study, future research will focus on older students, and will try to apply a meaningful co-evaluation. In that process it will use other collaborative and co-creation techniques - as the use of question online tutoring rooms, where students post and answer each other's questions and explain terms under the help of the teacher; curricula shaping and selection of the laboratorial work.

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