Ethics Issues of Digital Contents for Pre-Service Primary Teachers: A Gamification Experience for Self-Assessment with Socrative

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The European Conference on Technology in the Classroom 2016
Official Conference Proceedings

Abstract
The Knowledge Society has brought many possibilities for Open Education practices and, simultaneously, deep ethical challenges related to the use, sharing and reuse of digital content. In fact, even at the university level, many students do not respect the licences of digital resources. As part of the contents of a third-year Educational Technology course for Primary Teacher Training at the University of the Balearic Islands (Spain), students learnt about these ethics issues. During the 2015/16 academic year, 125 students from two groups of this course were involved in a gamification experience, using Socrative in real-time in the classroom, in which they had to answer different questions related to digital ethics. Its aim was not only to find out what the students knew before working directly with the topic – an initial self-assessment – but also to arouse interest and encourage dynamic participation and interaction. At the end of the course, students answered a questionnaire in which they were asked about their perceptions of the use of this kind of educational strategy and their transference in the future. Data were also collected from the same Socrative quiz and the final exam results related to digital ethics. Overall, the assessment from students was highly positive, as well as the scores of the questions related to digital ethics in the final test, and the conclusions of this study highlight both the importance of using more interactive educational strategies in the classroom and the need for training on digital ethics issues in teacher studies.

Keywords: gamification, higher education, teacher training, digital ethics, Socrative, self-assessment.

Introduction

The Internet has made it possible to access information and digital content to be reused in other contexts, which creates important ethical challenges (Farrow, 2016). Open education is especially interesting for future teachers of any level, who can create their educational materials by readapting the already available resources – images, sounds, videos and so on – on the Internet. However, the ethical challenges suggest that many students do not respect the licences of these resources, mainly because they are not aware of them.

Digital ethics is a part of the digital competence that every teacher needs to develop (UNESCO, 2011). Thus, many Teacher Training programmes consider modules or contents related to this aspect. At the University of the Balearic Islands (Spain), the students in the Primary Teacher Training programme must attend a course on Educational Technology, which includes digital competence and digital ethics, in their third year.

During the 2015/16 academic year, the students of two groups of this course were involved in a gamification experience using Socrative – a web 2.0 technology to create interactive tests – in real-time in the classroom to work on concepts and ideas related to digital ethics. The aim of this experiment was to connect students with their prior knowledge as an initial self-assessment, arouse interest and encourage student participation. After the experiment, students were given a questionnaire in which they were asked about their perceptions of the use of this kind of educational strategy and their transference in the future.

Therefore, the present work describes the educational gamification experiment with Socrative on pre-service student teachers for primary school, the results obtained from the same experiment, a final student questionnaire and the final test scores of the course (questions related to digital ethics). The conclusions show the value of the experiment and future lines of work.

Reference framework

The educational experiment is based on two main topics: ethical issues of digital contents, as part of the digital competence; and gamification, as the didactical strategy used for the experiment.

Digital ethics

The new technological and digitalized world comes with deep ethical challenges, especially related to open education (Farrow, 2016). Open education practices are based on four main principles (Valverde, 2010): i) knowledge should be free and open to be used and reused, ii) collaboration in the construction and reelaboration of knowledge should be enhanced and promoted, iii) sharing knowledge should be rewarded for its contribution to education and research and iv) educational innovation needs communities of practice and reflection that provide free educational resources. The practices and technologies from educational contexts considered ‘open’ could include access to educational or published research, software, policies, teaching methods, data sets or other educational resources (Farrow, 2016). However, the Open

Educational Resources (OER) that are most considered in Teacher Education are educational tools, learning contents/resources and implementation resources (licenses and interoperability) (Valverde, 2010).
Although there are important advantages of OER, derived from the open education principles, there are also some concerns. Two of the main issues in Digital Ethics, derived from ICT dissemination on a large-scale, are privacy and the protection of intellectual property (Maggiolini, 2014), which could be included as part of ethics and digital competences.

On the other hand, there is a need for students from different educational levels to develop these kinds of competences, including students in teacher training. New teachers must show competences that allow them to incorporate the digital world into the class – the use level – and enable them to behave coherently with the theory – the sense level (Burguet & Buxarrais, 2013; García-Gutiérrez, 2013). In fact, one of the areas to develop within the digital competences of teacher education (concretely framed in the information literacy) is digital ethics, which considers intellectual property rights, copyrights and ethics (UNESCO, 2011).
However, as Burguet and Buxarrais (2013) point out, training in the ethical dimension is lacking not only in the study programmes of teacher education but also in schools, in general. According to the same authors, teacher training should include the development of the ethical capacities of educational professionals, who can (in turn) secure the development of the autonomy of students so that students can think and reflect by themselves, considering ethical issues of digital content.

In this study, we focus on the work done within the university programme for primary teacher training related to digital ethics in the module of technologies applied to education.

Gamification

Gamification is defined as the use of game dynamics, mechanics and elements in non-game contexts (Deterding, Dixon, Khaled, & Nacke, 2011). As the main advantages in the educational context, gamification affects students' behaviour, commitment and motivation, which can lead to improvement of knowledge and skills (Hsin Yuan Huang & Soman, 2013).
The game elements can be shown in Figure 1:

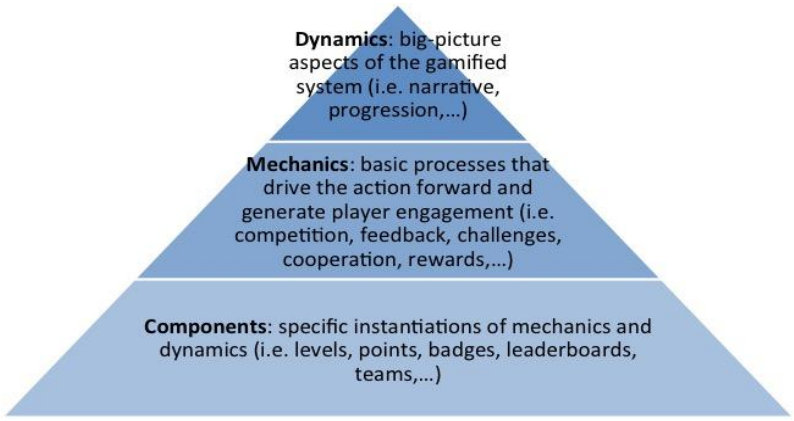

Figure 1: The Game Element Hierarchy, adapted from Werback and Hunter (2012, p. 82).

Some of the more accepted game elements that can be used in the learning context are: points, numerical values given for any single action or combination of actions; ranking, a classification or comparison among students from the same class or year; levels, a system to show student's progress in the assigned activities; badges, distinct awards for the consecution of an objective; and progression, a dynamic in which success is granularly displayed.

In the educational context, gamification includes a range of activities that cover: 1) the incorporation of game rules and structures into class activities or management, 2) learning activities through didactic games or serious games and 3) the gamified development of complex didactic strategies, which include different activity sequences such as the resolution of a case in a learning problem/project-based methodology. The latter is associated with a gamification vision that differs from the classical vision called 'game thinking' in which the goal of gamifying is to present a learning-teaching process centred on the students, where they (as players) get involved, make decisions, achieve progress, assume new roles, participate in a social environment and receive immediate feedback (Gallego, Molina & Largo, 2014).

In recent years, the number of courses that implement gamification strategies in higher education for different kinds of studies has been growing. These strategies are an effective way of maintaining students' motivation, concentration and engagement in the curriculum, such as in technical studies (Barragán, Ceada, Andújar, Irigoyen, Gómez & Artaza, 2015; Iosup & Epema, 2014; Villagrasa, 2016), economics (Arias & Djundubaev, 2015), medicine (Martin, Martin, Sanz, & Martín, 2014) or educational sciences, including teacher training (Villalustre & del Moral, 2015; Shiota & Abe, 2015).

Among the ICT tools that can be used to introduce game mechanics and dynamics into educational contexts are webtools, platforms and software (commercial and free). Some of them are Badgeville (http://www.badgeville.com), Openbadges (http://openbadges.org/), Classdojo (http://www.classdojo.com), Atta (http://www.attacommunity.com), Schoology (https://www.schoology.com/home.php), Kahoot (https://kahoot.it) and Socrative (http://www.socrative.com/).

Socrative is a free webtool that allows teachers to create questionnaires and use them in real-time to empower the engagement and assessment of students, individually or in teams. While the students are answering, the results are aggregated and visualised in real-time, which enables teachers to have instant insight into students' level of understanding concerning a specific topic related to the curriculum. This tool is very accessible, as it can be used by any device that has Internet connection (after the teacher gives the code to the students).

In the current experiment, Socrative was used to identify the initial knowledge and possible misconceptions regarding digital ethics.

The educational experiment

Context and methodology

The experiment was carried out with 125 third-year students of Primary Teacher Training at the University of the Balearic Islands in the course *Media and Technology Resources for Teaching and Learning in primary education* during the 2015/16 academic year. Students were organized into two groups with different teachers. The course followed a blended modality in which most of the hours were presential, but there was also online support using the virtual learning environment from the institution based on Moodle. This support basically consisted of the delivery of online materials that were used for in-class work, study preparation or assignment submissions. The activity (described below) was conducted face-to-face, in class, with the support of the classroom's computer, projector, whiteboard and the personal technological devices of the students – mainly laptops and smartphones.

A gamified questionnaire was created using Socrative with 27 items related to digital ethics, including copyright and the right to use and reuse digital information, as part of the second content module of the course. They had previously worked in the first module with the concept of digital competence and its areas, one of them being information literacy in which digital ethics is included.
Twenty-five of the items of the questionnaire were statements about students' knowledge, beliefs and personal use of digital information, 23 required a true or false answer and two required a multiple-choice response. The remaining two were short answer questions. Students entered their names and had to answer questions without the possibility of skipping items or changing their answers. Some of the students worked in pairs to answer the questionnaire.

After each response, students received immediate feedback on the answer chosen – the system showed them if it was correct or incorrect (self-assessment) – a brief explanation of the correct answer and some references to consult related to the answer. As students answered the questionnaire, the display of their progress with a table of results was shown in the whiteboard of the class in real time. At the end of the questionnaire, students received information on their scores in relation to the scores of their peers.

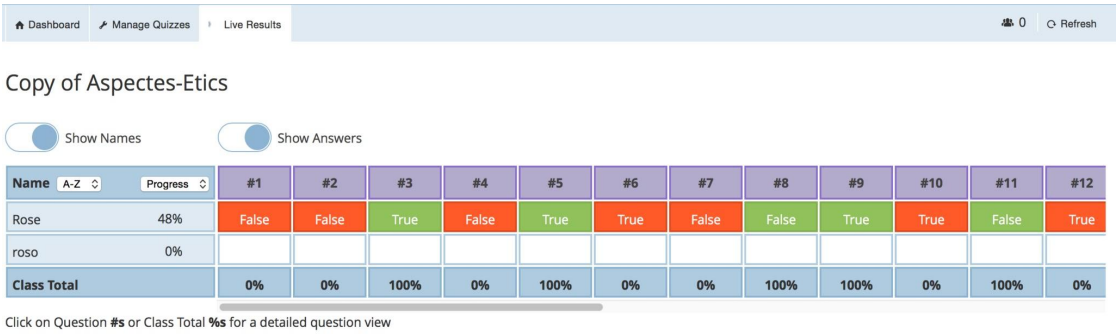

Figure 2: View of the live results of the Socrative questionnaire.

With this questionnaire, we aimed at connecting students with their prior knowledge, arousing interest and encouraging participation. The didactical sequence was developed through two main activities in a 1.5 hour session:

1) A questionnaire was administered in a face-to-face class session. The students answered the questionnaire individually or in pairs using their personal technological devices in 15–20 minutes. This part is related to self-assessment since students received the feedback on their answers immediately.
2) After the questionnaire, the teacher presented and assessed the global results of the questionnaire by starting a dynamic participatory class on the subject/topic. After the questions were discussed and the answers were justified, the students posed new questions in the form of use cases of digital information to answer in class with the aim of consolidating their learning.

Results and discussion

To assess the experience, information was obtained and analysed based on: 1) the opinion of the students through a final online survey and 2) the score obtained by the students in the Socrative questionnaire regarding prior knowledge of the ethical use of digital information aspects and examination of the subject.

The data obtained shows that the experience allowed students to connect with their prior knowledge and encouraged them to reflect on it. The results of the questionnaire show little prior knowledge and false beliefs, but the good grades obtained in the final test show the improvement of their knowledge of digital ethics.

About the gamification experiment

Data gathered from the student questionnaire

The final student questionnaire was answered by 78 students (out of 125) that participated in the educational experiment.
Among other items related to different aspects of the course in the final questionnaire, students were asked to score (from 1 to 5) their agreement with the statement *the use of quizzes or games to detect previous knowledge (as the quiz used on the topic of ethical uses of digital information) encourages learning and reflection*, 1 indicating disagreement and 5 indicating agreement. As can be seen in Figure 3, students' answers (groups 1 and 2) show a high agreement (79.3%). To indicate if there were significant differences between the two groups, students were also asked about their perceptions of the use of gamification strategies in other activities, such as for managing participation in classes and monitoring by using badges. The results show less agreement with the statements.

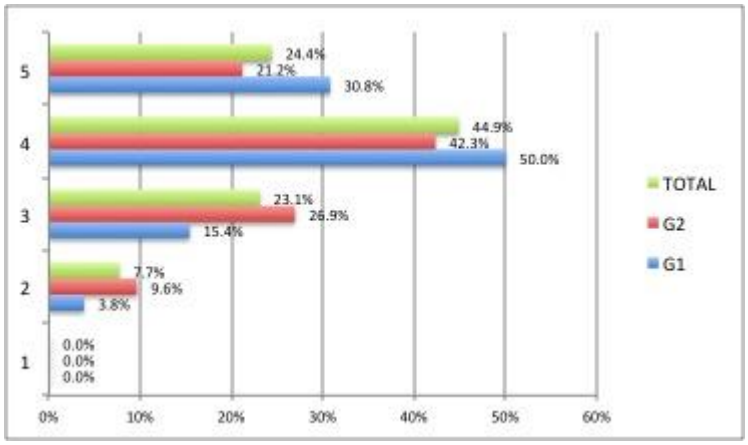

Figure 3: Results from the student questionnaire on the agreement with the statement *the use of quiz or games to detect previous knowledge encourages learning and reflection.*

Sixty percent of respondents show a high degree of agreement with the statement *the use of tools to manage student participation in classes (random selection of students who will participate) would speed things up in a fun way* with a deviation of 1.18 points in group 1 and 0.95 in group 2. Thus, there is greater variation among the responses of group 1 (see Figure 4). Similarly, 65.9% of their answers show a high degree of agreement with the statement *using badges in the working sessions of workshop (in the computer lab) would be a good strategy to motivate and track our activity in class* with a deviation of 0.8 points for group 1 and 0.7 for group 2.

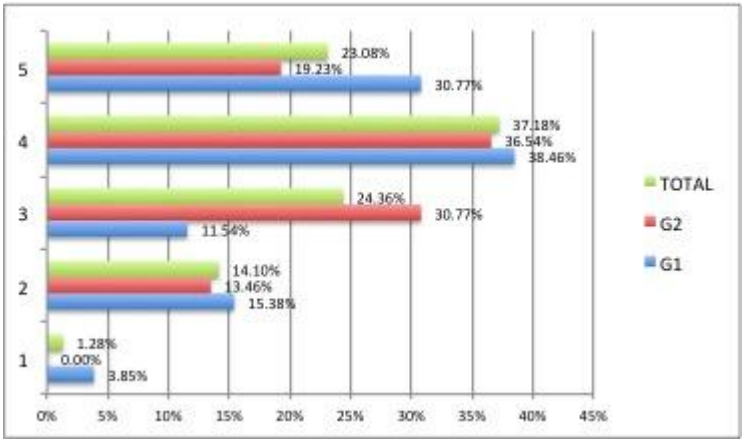

Figure 4: Results from the student questionnaire on agreement with the statement *the use of tools to manage student participation in classes (random selection of students who will participate) would speed up in a fun way*.

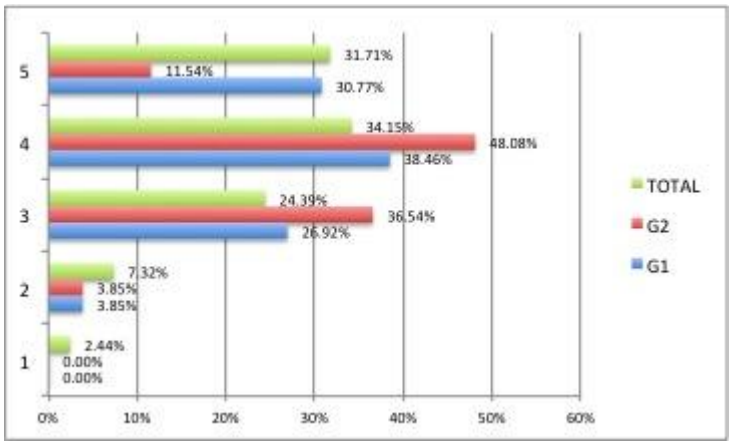

Figure 5: Results from the student questionnaire on the agreement with the statement *Using badges in the working sessions of workshops would be a good strategy to motivate and track our activity in class*.

These results indicate that there are low expectations of students in certain gamification strategies. Perhaps this could be explained by the lack of experience with this type of activity and the association of these aspects with games. This might shed light on the lack of knowledge related to gamification strategies in education.

About the class scoring

The total, averaged score of the Socrative quiz is 64% (64.3% in group 1 and 63.7% in group 2) with 16 correct answers out of 25 (15.4/25 in group 1 and 15.9/25 in group 2).

Total Score	**Group 1 Score**	**Group 2 Score**
64%	64.3%	63.7%
Total Correct Answers	**Group 1 Correct Answers**	**Group 2 Correct Answers**
16	15.4	15.9

Table 1: Scores of the Socrative quiz on the ethical use of digital information.

As illustrated in Table 2, items with the highest percentages of correct answers relate to broader issues in digital ethics, and items with the lowest percentages of correct answers include procedures or more precise aspects of the ethical use of digital information, which are especially important to incorporate in their educational practices as future teachers.

Statements with higher percentages of correct answers	
10. Using a fragment of a text segment to quote authorship is a communication act against an author's rights.	96.7%

16. Authors can authorise to distribute, copy or reuse the work.	92.7%
1. An author's rights of a work recognises intellectual property as a natural right to the individual creator.	92.2%
19. Creative Commons allows the authors to distribute their works with specific rights under certain conditions.	92%
Statements with lower percentages of correct answers	
12. A work is protected with copyright when the author registers it as such.	3.7%
6. Author rights allow the authors to adopt measures to preserve their authorship of the work—for example, in the promotion and recognition of authorship.	5%
20. Which one of these uses of information is adequate? A) Publishing a document that belongs to another person on a website or blog B) Making a copy of a musical work that is public domain C) Accessing and downloading free content D) Distributing our works with a Creative Commons license E) Creating a website or blog with links to other pages	12%
8. Making a copy of a CD is a reproduction act against author's rights.	18%

Table 2: Questions in the quiz with higher and lower percentages of correct answers.

The final exam of the course, which was a multiple choice quiz, included questions on the topic of digital ethics. The scores of these exams are high (around 90%). Group 1's exam included two questions (out of 20) with 94% and 83% of correct answers, respectively. Group 2's exam included one question (out of 20) about digital ethics with 94% of correct answers.

Conclusions

The educational experiment with Socrative has been an interesting experience that has achieved the expected objectives of the teachers and authors of the current paper, which were: 1) to expose the prior knowledge of students on the topic of digital ethics while removing misconceptions, 2) to motivate learning and 3) to encourage participation. In fact, the answers to the questionnaire resulted in a dynamic participatory class that addressed these aspects in-depth and in response to student interests (and/or their false beliefs).

It is possible that the ludic/gamified elements in the learning activity have been useful to students to be willing to verbalize and participate. In the activity, some of the dynamics, components and elements of games were identified (Werback & Hunter, 2012), i.e., progression in the quiz (a dynamic), competition among peers – or collaboration in the case of working in pairs – and immediate feedback (components) and the existence of a leader board and punctuations (elements).

However, students' perceptions of the educational possibilities of gamified elements were rather low. This is probably related to the fact that they had not experienced this kind of activity during their studies, so they did not know what the educational possibilities related to gamification are or how to design educational experiences that use these strategies in an effective way. Or, perhaps, they considered that these elements cannot be useful in other contexts; this is the kind of thinking that students usually have towards any technology that they do not consider to be for academic purposes. Therefore, for future research, it would be interesting to go deeper into the reasons for these scores and see the actual motives, contrasting with successful gamification experiences, like the one explained in Villalustre and del Moral (2015), which show a high level of motivation and satisfaction by the students and the development of generic competences.

Despite the limitations related to the coverage of the educational experiment on gamification, this study has shed light on the importance and need of teaching Primary Teacher Training students about aspects related to the use of digital information, as they will be the teachers of the future (Burguet & Buxarrais, 2013; García-Gutiérrez, 2013). Technology is becoming increasingly more present in every aspect of life, so it is essential that every citizen now and in the future uses digital contents and manages licensing in a proper way, being respectful to others' authorial rights when using contents and conscious of the rights of their own works when creating new contents. Of course, this also applies to any educational resource – images, videos, audio, activities, documents and so on – that teachers use and/or create. This idea is also one of the trends that was included in the Horizon 2016 report for university teaching (Johnson, Adams Becker, Cummins, Estrada, Freeman & Hall, 2016).

On the other hand, in the current Knowledge Society (where information is available everywhere), every educational institution needs to find ways to engage students with the contents of the course, arouse interest in them and motivate students' dynamic participation and interaction in the classroom. This educational experiment has shown a successful way to do this based on a small-scale gamification experience. As future work, a large-scale gamification experience could be considered, as well as transversal experiences, including different courses in the academic year.

Acknowledgments
This work is framed within the teaching innovation project funded by the University of the Balearic Islands in the academic year 2015/16 called *The student's participation in learning assessment through the use of formative assessment strategies*.

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