



ESPAIS D'APRENTATGE: AGENTS DE CANVI A LA UNIVERSITAT

The TOP gamification platform as a change agent in the acquisition of the competences attributed to the Degree in Computer Engineering

Marta Fuentes Agustí

Universitat Autònoma de Barcelona (UAB)

Departament de Psicologia Bàsica, Evolutiva i de l'Educació, UAB

Campus UAB, Facultat Ciències de l'Educació, G6-253, 08193 Bellaterra (Cerdanyola del Vallès),
Espanya

marta.fuentes@uab.cat

Sergi Robles Martínez

Universitat Autònoma de Barcelona (UAB)

Departament d'Enginyeria de la Informació i de les Comunicacions (dEIC)

Campus UAB, Escola d'Enginyeria, Edifici Q, 08193 Bellaterra (Cerdanyola del Vallès), Espanya

sergi.robles@uab.cat

Sandra Miguel Peña

Universitat Autònoma de Barcelona (UAB)

Departament de Psicologia Bàsica, Evolutiva i de l'Educació, UAB

Campus UAB, Facultat Ciències de l'Educació, G6-253, 08193 Bellaterra (Cerdanyola del Vallès),
Espanya

sandra.miguelp@e-campus.uab.cat

Adrià Sanchez Carmona

Universitat Autònoma de Barcelona (UAB)

Departament d'Enginyeria de la Informació i de les Comunicacions (dEIC)

Campus UAB, Escola d'Enginyeria, Edifici Q, 08193 Bellaterra (Cerdanyola del Vallès), Espanya

Adria.sanchez@deic.uab.cat

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ESP AIS D'APRENENTATGE: AGENTS DE CANVI A LA UNIVERSITAT

Jordi Pons Arózt egui

Universitat Autònoma de Barcelona (UAB)

Departament d'Enginyeria de la Informació i de les Comunicacions (dEIC)

Campus UAB, Escola d'Enginyeria, Edifici Q, 08193 Bellaterra (Cerdanyola del Vallès), Espanya

Jordi.pons@uab.cat

1. RESUM:

Es presenta l'evolució de la plataforma de gamificació utilitzada pels estudiants de l'Escola d'Enginyeria de la Universitat Autònoma de Barcelona. La plataforma va ser creada com una eina per assignar mèrits i crear classificacions d'estudiants en un context gamificat, però els canvis introduïts posteriorment han augmentat l'eficàcia en quant a l'adquisició de competències. Al llarg del text es mostra la seva transformació i la de tot el procés de gamificació des d'un enfocament psicopedagògic.

2. ABSTRACT:

This paper presents the evolution of the top gamification platform used by engineering students at UAB. The platform was initially conceived just as a technological tool to assign merits and create rankings of students in a gamification context, but during the last three years it has proved to be an effective changing agent regarding competence acquisition. This paper shows how the platform and the whole gamification process around it are being transformed from a psychopedagogical approach.

3. PARAULES CLAU: 4-6

Gamificació, Educació Superior, competències, motivació, aprenentatge, avaluació.

4. KEYWORDS: 4-6

Gamification, Higher Education, competences, motivation, learning, assessment.



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5. DESENVOLUPAMENT:

1. Introduction

In 2010 there were two events that promoted the use of the term gamification among general population, causing a widespread interest worldwide. On the one hand, the presentation that was made viral at the DICE Conference by professor Shell from the Cornegie Melon University. And on the other hand, McGonigal's book that caused the same effect (fig1). The most accepted definition to conceptualize gamification is provided by Werbach (2014): the use of elements and techniques of game designing in contexts that are not ludic. Gamification uses the predisposition of the human being to play in different contexts. In every game there is a reward, a prize, reaching a goal faster than others, etc. It is about winning, respecting certain rules for the correct functioning of the game. Thus, gamification seeks to apply these game conditions in a different context, such as the classroom, so that students can playfully learn having fun.

Figure 1. Timeline of the evolution of the gamification concept.

The interest on gamification is still being experienced. This can be inferred by the amount of research articles that are published on the use of gamification in different areas such as health, for treating phobias (James, 2014); in the business field, to increase the productivity of employees and customer's commitment (Werbach, 2012); or in the environmental field, promoting recycling and energy saving (Carceller, 2016). Another indication of the interest on gamification is the evolution of the times that the term has been searched for in Google. Figure 2 shows a spectacular growth from 2009 to 2013 -coinciding with the first conferences and books on the topic-, and remaining stable until now (Fig2).

Figure 2. Close interest of the "gamification" term through Google.

Humans have a positive bias towards certain game characteristics or mechanics, such as competition, cooperation, collection, exploration, progression, surprise, completion, etc.



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Gamification consists in exploiting this in order to improve the participant's experience in other non-game contexts, as the classroom, by improving students' motivation towards learning.

1.1. Gamification as a change agent at University

At the end of the 20th century, the idea that a new focus on learning in higher education is needed is widely accepted, and the Bologna process played an important role in leavening this change, both politically and institutionally. Advances in technology were introduced to universities, thus motivating a wide range of innovative experiences. The introduction of gamification to Higher Education goes back to this time, in the quest of new methodological strategies that contribute to increase motivation, attention and participation in the classroom, and that translates into an improvement of the academic performance of students.

2. The process towards TOP

Professors from the Department of Information and Communications Engineering (dEIC) of the Universitat Autònoma de Barcelona (UAB) created in 2016 the TOP gamification platform (<https://top.uab.cat>). Since then, it has been in constant evolution, adding improvements suggested by teachers and students.

During the academic year 2016-17, a study was started on the use of gamification and the platform from a psycho-pedagogical perspective. This study aimed at incorporating elements of improvement with psychological and educational models and benchmarks that framed the improvement of teaching quality and student's competence learning.

The design and construction project of the TOP platform begins with the proposal of some dEIC's teachers to develop a room escape activity at the end of the academic year 2014-15 as a prize for students that have solved a number of challenges.

The objective was to motivate students to increase their academic performance during the



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course. The knowledge acquired throughout the course was essential to solve the different published challenges in an effective and efficient way. This dynamic was consolidated and was named DEIC Escape. The activity was publicised with a trailer video that was uploaded to YouTube and showed on the first day of class (<https://www.youtube.com/watch?v=Q6xlulv5c4Y>).

Due to the good results of the DEIC Escape experience, it was proposed to continue with this innovation during the following academic year. In the second year, though, specific challenges were replaced by merits that were awarded after the accomplishment of different tasks or actions. The number of activities rewarded with a merit increased significantly, and the TOP platform was developed to advertise merits, assign them to students, and list rankings based on the merits granted to the students. We had at that moment our first incursion to gamification, with an ad hoc platform that we could be easily customised if required (Fig3).

Figure 3. Concept and evolution of the TOP platform.

Three years later, and with the experience of the application, the authors of this text consider that we had to take the gamification process a step further, analysing the specific and transversal competences worked through merits; the type of designed actions and tasks, and those that are more participated; the possible impact of player profiles, learning styles, and methodological strategies for training; etc. That is, how the different agents involved in this gamification experience use the TOP platform, what are the reasons for using it, and what are the consequences it entails. We aim at going beyond technology and create an attractive teaching and learning process, and assess the effect on academic performance and teaching quality.

3. evolution of TOP

By taking into account the inputs of all the participants, both the teachers and the students, the TOP platform has evolved during these three years. Next, we outline its main changes and their motivation.



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During the first course, we realised that the students were not engaged enough by publishing the ranking that ordered them using only their average grades, so we decided to suppress it. As the absence of a feedback loop was identified as one of the reasons of why this ranking was completely unattractive to the students (the average grade is only updated twice a year), we tried to improve this on the merits' ranking by adding subjects' filters. This way, even the students that only perform well in one or two subjects, so they are far from the top of the general ranking, are now capable of reaching the best positions of their favourite subject's ranking. We also added a counter of how many times has been every merit awarded, as a measure of how difficult it is to obtain it.

During the second course, we had to deal with a couple of situations that were not considered during the initial design. On one hand, we had to implement a new ranking for graduates, in order to maintain them on TOP, but to separate them from the students that are currently participating and obtaining merits. On the other hand, we had to implement a new set of ranking rules to deal with those students that were not able to pass a subject on the previous course, but have obtained some merits. Lots of questions about the fairness of the merits obtained on past courses were raised at this point, and we tried to answer all of them while avoiding punishing the students that course a subject for their first time. The main decision was to maintain old merits obtained by students that repeat a subject, but do not value them when calculating their ranking.

During the third course, we noticed that some teacher's implication with TOP was declining due to the amount of time and effort it required from them. Therefore, all new changes were aimed to help them and to facilitate their interaction with the platform. We introduced a massive merit assignation feature that allowed them to assign merits by uploading a text (.txt) file containing a collection of students IDs (previously, it was required to click over the name of every student to assign him a merit), we allowed teachers to name representatives (usually, the teachers in charge of the laboratory practices) that could create and assign merits in their behalf, and we introduced a tool that allowed teachers to import previous courses' merits in order to re-use them instead of



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having to re-create them.

Summarising, during the first course, we focused on improving the students' experience, during the second course, we improved the long-term design of the platform, and during the third course, we optimized the teacher's interaction.

4. Participation

Currently, there are 10 subjects in the Degree in Computer Engineering that participate in the gamification experience using the TOP. Each of these subjects has assigned a maximum number of merits that the student can achieve (figure 4). These merits are awarded to any student who performs the action or the task that is requested in order to achieve it. The typology of these actions can be very diverse, ranging from the participation in class to the decoding of a mathematical code to arrive at the solution of a problem.

Figure 4. Number of achievements assigned by subject.

Source: Own elaboration.

During this gamification experience, a total of 73 different merits have been created. Fig5 shows the information about the merits given to all students enrolled in each subject during the first academic year of the top.uab (2015-16) and the second academic year (2016-17), along with the number of students enrolled in each of the 10 subjects that participate in the gamified experience

Figure 5. Students enrolled in 2015-16 and 2016-17 and achievements awarded in the subjects.

Source: Own elaboration.

5. Participant's profiles

During the academic course 2016-2017, 56 students from the Computer Engineering Grade at the



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Autonomous University of Barcelona volunteered to complete the User Types Hexad Test.

Results show that the predominant profile (35%) is the achiever. This profile's characteristics value autonomy, like challenges and try to complete difficult tasks/assignments. Those are characteristics that are intimately linked to the competences that the Computer Engineering Grade students should develop, as the ability to solve problems with initiative and creativity.

However, the results also show that all profiles are well represented (being the socializer, with a 20%, the lesser). This reinforces the original idea (although we never measured if it was actually applied) of encouraging the teachers to design activities and merits that could engage all types of players, instead of focusing only on the one or two predominant profiles.

6. Participant's view of the experience

With the participation of four of the responsables of TOP's development, two teachers of a different university that also apply gamification techniques, and some students that volunteered to participate on this study, we have performed some interviews and studied two focus groups to collect qualitative data about the first years of the TOP experience. While analysing this data we detected three main topics about the participant's perception of TOP.

The first one is the correct alignment of the experience's objective, all participants share their view of TOP as a tool that helps them increase the students' motivation (direct objective) towards an improved academic performance (indirect objective).

The second one is about methodology. About this topic, we found some coincident points, as the emphasis on the voluntary participation, where no one is forced to participate, but everyone has to be able to easily participate in its desired degree (that does not need to be the same for all participants). We also found some discrepant ideas about how to conduct the main dynamic



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(obtain merits that translate into points that improve your ranking's position) because different teachers of different subjects design the tasks related to the merits differently. Also, participant teachers showed different ideas about how to integrate the gamification experience results with the student's grades in order to improve their engagement.

The third one is about results' measurements. Although almost all participants said that the experience aimed directly towards a motivation increase. There is a consensus about measuring its success by studying its impact into the student's academic performance (measured via average grades). When confronted with this incoherence, all groups reached more or less the same conclusion: motivation does not provide value by its own, and a real success will be achieved only if this motivation helps the students to improve their learning.

7. Activities' improvement

With the TOP platform widely tested and optimised, it is now a good moment to start working on the improvement of the design of the activities that lead to the obtention of merits.

Until now, every teacher performed their own and personal evaluation of the activities of his subject, without the participation of any other teacher, and without a guide of how these activities should be. This has provoked, for example, that almost every subject participating in TOP has defined a merit that it is awarded to the students that obtain a certain grade in the final exam, although the students recognize that this merit does not motivate them during the course, because they consider the exam as a long-term objective that does not requires any immediate action until the last weeks (or days) of the course.

In order to solve this, we started to work in the creation of an analytic rubric that could be used by the teachers to evaluate and improve their activities. This kind of rubric, the most used at Superior Education, evaluates separately the components of a complex system. We aim to build a tool that evaluates the whole TOP experience, taking into account questions as: what are the



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competences that lead to the obtention of more or less merits?, are the merits varied enough to engage the different types of participants?, are all the learning objectives mapped to activities?, etc. Moreover, this rubric (and its results) will also be used to train the teachers into designing more successful, motivating, engaging and motivating activities.

As a first step towards the definition of this rubric, every involved teacher started to fill a form with all the information about the activities and the merits of their subject, including questions as: how is this merit/activity announced to the students?, how is the successful completion of this activity announced to the students?, etc. Unfortunately, this step has become more demanding than expected, and it has coincided with the period of the course when the teachers have less available time (because of all the personal tutories previous to the final exam, and because of the correction and revision of the final exam itself). Therefore, this collection of information has not been completed yet, and the rubric has not been completely defined.

8. Conclusions and prospective

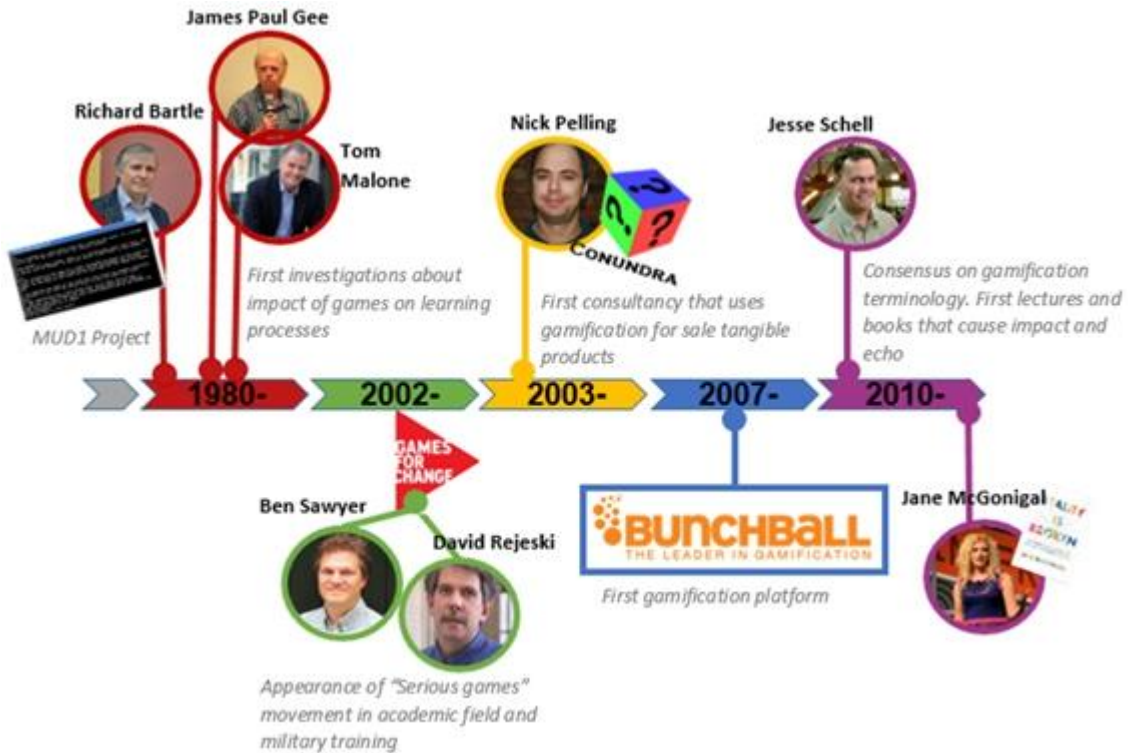
The gamified experience of TOP has evolved and improved thanks to the changes that were requested by the users, both students and teachers, during the firsts stages of its deployment. Almost all of this changes affected the way the users interact with the platform.

During the implementation of these improvements, we have detected a new need: to analyse, from a psychopedagogy perspective, all the activities that form the experience, while understanding it as a whole (the grade), instead of as the sum of its parts (subjects). This leded us to do a review of the activities to take into account, mainly, the variety of the types of participants and all the competences that the students of the grade have to develop. We are in the process of designing a rubric that will allow the teachers to analyse their contribution to the experience and that will assist them into the designing of activities that motivate the students to achieve their learning objectives.

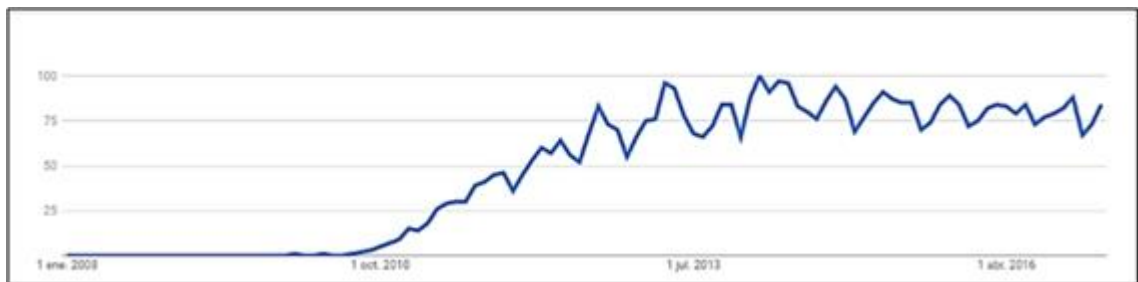


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5.1. FIGURA O IMATGE 1



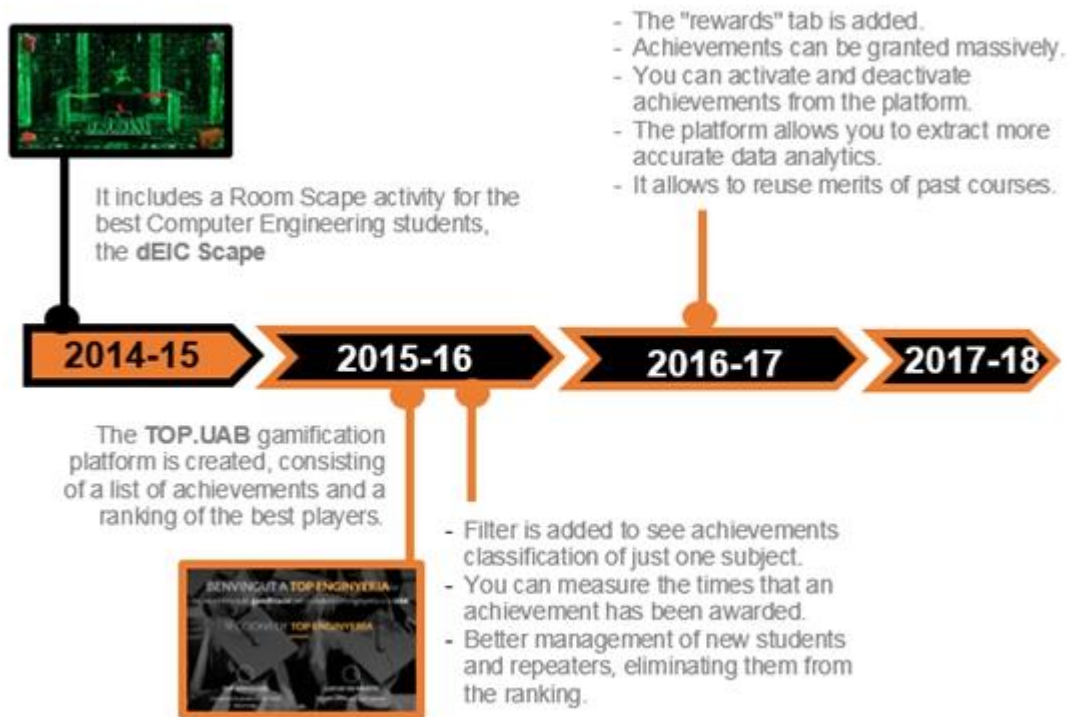
5.2. FIGURA O IMATGE 2





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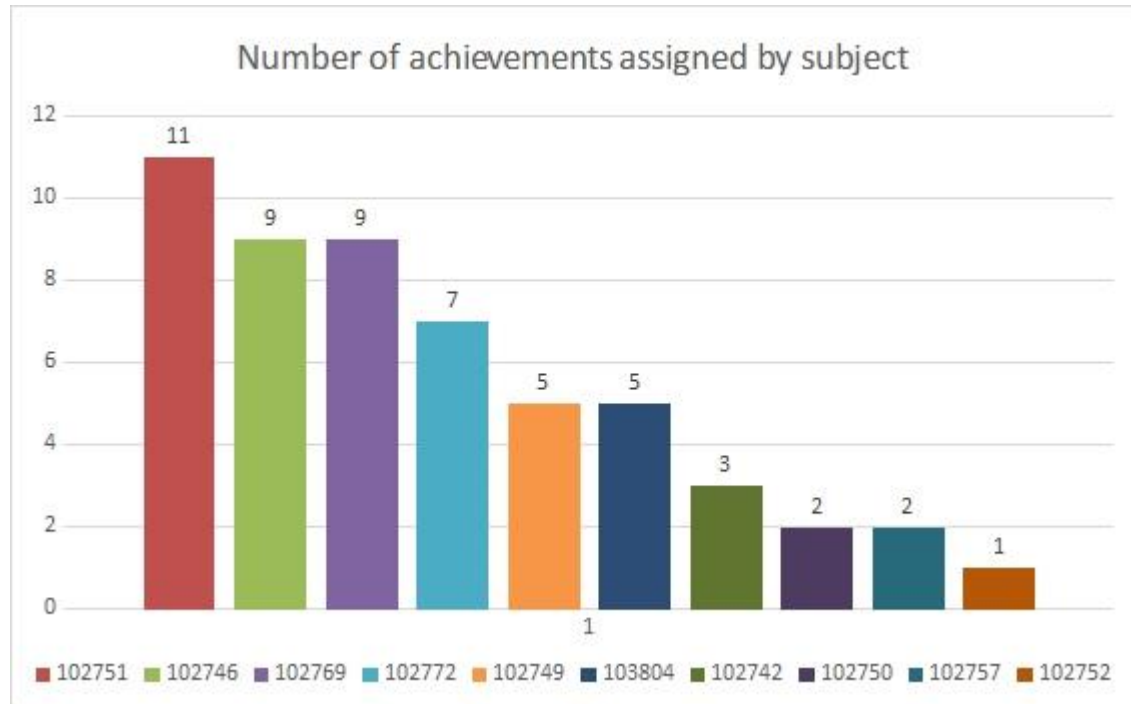
5.3. FIGURA O IMATGE 3





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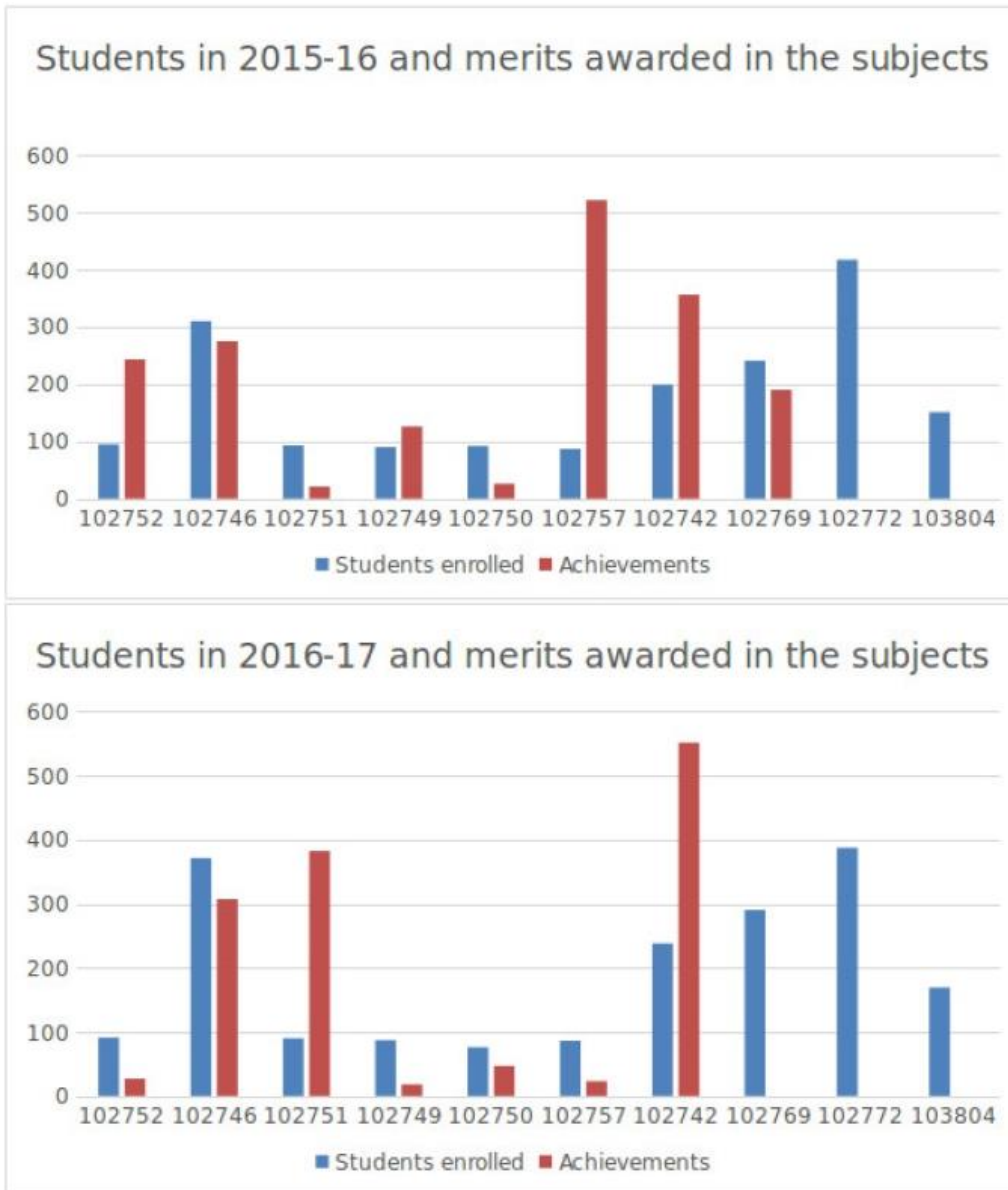
5.4. FIGURA O IMATGE 4





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5.5. FIGURA O IMATGE 5





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6. REFERÈNCIES BIBLIOGRÀFIQUES (segons normativa APA)

Carceller, C. J. (2016). La gamificación en aplicaciones móviles ecologicas: análisis de componentes y elementos de juego. Sphera Pública. Revista de ciencias sociales y de la comunicación, 1(16), 95-113. [<http://sphera.ucam.edu/index.php/sphera-01/article/viewFile/280/249>]

Werbach, K., & Hunter, D. (2012). For the win: How game thinking can revolutionize your business. Wharton Digital Press. Pennsylvania.

Werbach, K., & Hunter, D. (2014). Gamification. Coursera. [<https://www.coursera.org/learn/gamification>]