TUTORING AND COACHING THE STUDENTS IN CLASS DURING THE FIRST 4 MONTHS AT THE UNIVERSITY

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Abstract

The first year at the university is a moment of transition where the students must confront a change on the educational tools and organization. Moreover, at a personal level, the students must decide if their chosen degree provides everything they expected.

Although the courses often include basic concepts that have been learned mechanically in secondary and high school, the students only seek to fulfill the required procedure of evaluation and this is an error in this learning period. In addition, if the student does not pass the exams, the insecurity begins and the self-esteem and the capacity to be able to face the studies decrease. This work makes a studied about the ways to help the students to adapt and get good behaviours to address their fears.

Overall, all the subjects that are offered in the first term/first year have a section reserved to laboratory and/or computer practices, in which there is a personal contact with the students. Although this is the part of the course that should motivate the students to broaden their knowledge of the subject, sometimes this is not the truth. This fact makes the laboratory and computer practices boring and uninspiring instead of means to consolidate the contents of the course.

In this work, which is based on the experience of the last 7 years, it is analysed the attitude and opinion of the students related to one of the most difficult subjects for them that is mathematics.

New innovative methodologies are researched that fit the time and the number of students per group during their practices and different ways to be implemented are considered in order to be able to keep the students interested in learning.

The course in which this work has been performed is Mathematics I. This work shows the pros and cons of the previous practice program and compares it with the improvements proposed of a dynamical practice program, more in tune with thoughts, mathematical level and motivation of each student.

This is the way to change the mind of the students, which often judge the syllabus unreasonable, difficult and unnecessary for their professional career. There are many benefits but the most important is to work with the communication and respect between the student and teacher. It is important to teach interest in the subjects and give them tools to find sources to overcome the obstacles.

Keywords: Motivation, Coaching, Tutoring, Mathematics, Computer, New Methodologies, Education.

1 INTRODUCTION

The first few months of college are always critical for the students. Although the attrition rate in the Basque Country is less than in other autonomous communities, this is not incompatible with the difficult current situation that live many students during their first year of college[1][2][3][4][5]. The student starts his undergrad studies with insecurity; they don’t know if they are going to like the chosen degree and furthermore their classmates are unknown. On the other hand, first year’s subjects are both fundamental and the basic knowledge they are going to need for their future professional development. In engineering degrees, the mathematical subjects, adapt their syllabus to the basic fundamentals and the mathematical concepts that are going to be required in other subjects of the specialization, therefore, in most degrees their name is “Fundaments of mathematics”. During these first months of the school year the professor detects a very heterogenic level of knowledge, which produces a great difficulty when it comes to teaching classes since there is an academic plan of contents that must be accomplished and the student, must adapt to a different learning rate than in previous years [6][7].
Thus, it is very important that the faculty value both the attitude (how they face their new situation) and the aptitude (intelligence) of first year’s students. It is essential to avoid that the students start stressing about mathematics [8], provoking animosity towards the subject, and subsequently dropping the subject and leaving it for the following year.

Besides, in many cases, the student chooses a degree by ruling out the options that are available to them due to their high school marks, and, this clearly affects the likelihood of dropout. Therefore, in a context of group adaptability, what happens if this animosity spreads to all the subjects? Then, the student’s motivation droops and the possibility of withdrawal/dropout increases [2].

As for the personal situation of the students, nowadays, it is only taken into account if the student takes care of a family member, works or they are top sportmen/women. In these cases, the Regulations provide help to coordinate their situation with the evaluation system [9],[10]. Nevertheless, these degrees have strong vocational links because their job opportunities are closely related to the marine medium.

The type of student is diversified since many of them have a worker profile and combine work and school with the intention of obtaining a degree and be able to choose other jobs within the professional sector. For this kind of students, subjects such as mathematics and physics, makes no sense, producing a negative attitude towards these subjects.

What tools does the faculty have to deal with this situation? Some indicators have to be defined to detect these situations. These indicators must allow to evaluate the attitude and aptitude needed in the chosen degree.

Regarding the tools that the University has in these degrees, the Nautical College at Santurce, there is a school ship at students’ disposal, that is useful for strengthening relationships between the students and the decision of the chosen degree [12].

Besides, the Basque Country University assigns to its professor’s office hours to give students the opportunity to ask in-depth questions and to explore points of confusion or interest that cannot be fully addressed in class [13], [14]. However, sometimes, these questions are not related to the contents of the subjects but they are due to a lack of basic foundational knowledge needed in order to understand the subjects [15], [16]. It is a reality that the system does not consider the coach figure, which monitors the improvement and the potential problems of the students. Moreover, at this moment, the family, friends and the classmates themselves accomplish the coaching function.

Office hours should take into account the assistance offered not only in learning material but also in achieving their life goals.

The main aim of the present work is to seek assignments in order to assess the attitude and aptitude of the students (“Nautical and Maritime Transport” and “Marine” degrees) towards the subject (Mathematics) and if necessary search for procedures that facilitates knowledge acquisition in a more relaxed way, despite the difficulty of the subject.

The group of people we have worked with is the corresponding to the actual academic year 2018-2019 of both degrees [17], [18]. Every mathematical tool used during the year has been analysed and improvements have been reconsidered for next year, in order to ease and motivate the student in the mathematical knowledge.

2 METHODOLOGY

Firstly, we are going to analyze both the background of the studentbody and the current syllabus of the subject. After defining this starting point, we are going to determinate the evolution of the students during a term, using some indicators. Finally, we are going to detect the problems that have arisen during the year and propose possible solutions.

In order to value properly the attitude and the aptitude of the students towards the subject is required to resort to certain indicators. In the current work, we are going to evaluate the five most relevant indicators: lessons attendance, office hours attendance, virtual platform activity (e-gela), term assignments involvement and student surveys. These indicators are easily quantifiable and supply a reliable and comparable tool. In Table I, these indicators are described.
Table I: Description of the indicators used.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Explanation</th>
<th>Task</th>
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<tbody>
<tr>
<td>Lessons attendance.</td>
<td>Monitoring the attendance: A decrease in the attendance is a clear indicator of the dissatisfaction of the student.</td>
<td>The monitoring of the attendance can be easily achieved using signature sheets.</td>
</tr>
<tr>
<td>Virtual platform activity.</td>
<td>In the Basque Country University (UPV/EHU) the students have a web platform (e-gela) at their disposal that is useful as support of the subject. It is expected a regular and frequent access to it, and therefore, changes in this frequency are meaningful.</td>
<td>Student report of E-Gela</td>
</tr>
<tr>
<td>Student surveys.</td>
<td>The last day of term, the students are presented with a satisfaction survey for feedback on the subject. Two of the most important questions are about the difficulty of the subject and the compatibility with the professor.</td>
<td>Feedback for the next year</td>
</tr>
<tr>
<td>Term assignments involvement.</td>
<td>These assignments are a useful tool of communication between the professor and the student. This way the professor has a clear idea of the students’ situation with the topic and the students learn what the most important topics within the subject are. The decrease of the number of students that hand over these assignments is an interesting indicator.</td>
<td>The computer practice report.</td>
</tr>
<tr>
<td>Office hours attendance.</td>
<td>The professor in a general or particular way invites the student to attend to office hours to address a specific topic or issue related to the subject. The attendance to office hours indicates the degree of involvement of the student with the subject.</td>
<td>The seminary project. The computer practice report.</td>
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3 ANALYSIS

Via the analysis of the prior studies with which the students can gain admission to the degrees, we have reached the conclusion that the considered group is extremely heterogenic. This is because the minimum grades to be accepted in these degrees are very low and, therefore, students are accepted from every type of upper secondary education (from Baccalaureate to higher level vocational training). On the other hand, their personal situation also varies significantly, being usual to coordinate work with these studies.

Overall, analysing the syllabus corresponding to Mathematics I, it can be observed that two-thirds of the subject’s content have already been addressed in some of the different types of upper secondary education, but not in all of them. The revision of these topics is not only a review but also a chance of strengthening the knowledge of these important concepts that previously have only been mechanically learned. In addition, it tries to create a common and solid basic knowledge, from where it can be broached new and more difficult topics. The remaining third of the subject corresponds to these new topics.

Regarding the kinds of lessons, there are three main types: lectures, seminars and laboratory/computer practices. Both in seminars and laboratory/computer practices there are a lower number of students, and, thus, it is possible to have a more personalised treatment with the students. As well as these lessons, the professor has weekly office hours where the student can question any doubts on any of the topics addressed in the subject.

The assessment criteria are key to an adequate design of the subject. A robust assessment system also gives a deeper insight of the cognitive evolution of the contents. Usually the student only focusses in the topics that are going to be tested. For that reason, the assessment criteria must reflect the items that the professor considers important. From the first day of class, these criteria must be clear and it is likely that there is going to be a need to repeat them during the term. These criteria are fixed without the option of any change during the term.

Currently, the computer practices of Mathematics I focus on the knowledge of the calculation program Matlab. During 5 sessions the student learns how to use this program, how to program within it and some ideas about symbolic calculations. In this way, computer practices are completely isolated from the rest of the subject entailing a 10% of the final mark. The lack of involvement with the remainder of
the subject and the difficulty of learning how to use new software are additional problems during the first term of university. It can be said that the students want to get rid of the practices more than learn.

There have been 80 students enrolled in Mathematics I during the 2018/2019 course. However, not all of them are involved in the subject. In the Basque Country University (UPV/EHU) the students have a web platform (e-gela) at their disposal that is useful as support of the subject. It has several sections, such as syllabus, tasks, exams where the students can acquire additional content of the subject. In particular, the amount of student that have never enter the exams sections gives a clear idea of the number of students that are not involved in the subject from the beginning. Figure 1 shows the number of times each student enters the exam section. It shows that almost half of the enrolled students (39 students) have never checked this section in e-gela.

Figure 1: Proportion of times each student enters the exam section of web platform.

Figure 2: The attendance during the term for both degrees.
Figure 2 shows the attendance during the term for both degrees. The average attendance is of 36 students per lecture. During the first third of the course (9 lessons) the average attendance is of 45 students, during the second third this number decreases to 34 students, meanwhile, during the final third continue decreasing until 26 students per lesson. This means that the lecture attendance decreases continuously with the progress of the subject. The attendance is a 40% lower in the last third of the term than in the first third.

4 PROPOSAL

The professor is passionate about math and teaching and, therefore, they try to transmit this passion to the students, beyond the pure mathematical knowledge. In doing this their teaching activity is configured as a mathematic coach, that are able to support the students from a closer and more personal point of view, without losing in any case the strength and seriousness that must have teaching the subject. The teacher has two areas to work, lessons and office hours.

There are many support tools that can be used in order to improve the work that must be done on the students’ aptitude (knowledge). However, there is a limited amount of time for an extensive subject. One of these tools is the use of symbolic calculation software in computer practices hours that is already being used. In this new proposal, we want to incorporate this calculation software in a more effective way, relating each computer practice with the lessons that have been explained that week. From the multiple options we have chosen the Mathematica software due to its simplicity and capacity. The computer practices consist on 5 practices of 2 hours each (see Table II).

The professor should work the attitude of the students towards the subject in office hours and in those tasks where there is a smooth interaction between the professor and the student, this means that the computer practices are also a good situation where the professor can work on the student’s attitude.

Table II: Description of the computer practices consist.

<table>
<thead>
<tr>
<th>Lessons</th>
<th>Objectives</th>
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<tbody>
<tr>
<td>Previous concepts</td>
<td>Evaluate the previous knowledge and introduce Mathematica as a support tool</td>
</tr>
<tr>
<td>Graphic representation of functions</td>
<td>Plot and interpret basic functions. Link these functions to everyday life behaviours</td>
</tr>
<tr>
<td>Derivatives</td>
<td>Definition of the derivative concept and use of Mathematica to check the results</td>
</tr>
<tr>
<td>Integration</td>
<td>Definition of the integral concept and use of Mathematica to check the results</td>
</tr>
<tr>
<td>Evaluation and hand out of the practices notebook</td>
<td>In situ evaluation, hand out of the practices notebook and problem solving.</td>
</tr>
</tbody>
</table>

Within office hours, 1 hour per week at least should be done in the computer room, so the students can go there to solve problems, use Mathematica and question doubts to the professor. The students can also ask for more office hours in the computer room and/or for group tutoring. If this happens, they would be publicly published.

The assessment system is based on the practice notebook, which is the place where the students have written all the computer practices plus the in-situ evaluation of the 5th practice. This notebook also serves as a place where all the personal work done during the practices can be written.

The professor would monitor the students during these practices, which would help how to evaluate the progress, the level of knowledge, and therefore, would allow that the evaluation system fits the knowledge’s level that the students must have in order to prove the subject.

5 CONCLUSIONS

Mathematics and Physics are the most difficult subjects for the students in the first tear of both degrees. This leads to a lack of motivation when the students fail to understand the concepts studied. The objective of this work is to reflect on this situation and seek tools to improve the student’s attitude in the following years.
In this work we have proposed two different tools. The first one is to modify the computer practices using a new calculation Software (Mathematica) that is more suitable, and to select the content of the computer practices according to the syllabus and the content studied at that moment. The second tool is to use either the office hours and/or the computer practice hours to improve the communication between the professor and the student via coaching them. It is important to control the indicators related to the student’s attitude in order to achieve more dynamic lessons, which can be adapted to the class situation.

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REFERENCES


