Debating teaching attitudes for a successful learning approach

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Abstract

This paper discusses the needs that should be fulfilled by both the teachers and the students for a successful learning process approach. It is based on the experience of teaching civil engineering students, both from the last years and also from 1st year, during the most recent years. Although the problems faced at teaching each student age are very different, the essence remains similar, and that is motivation for hard work. University students seem quite lost in the way to achieve their goals of success. It is one of the teacher's aims to give them back the joy of learning. Two learning/teaching experiences are presented and discussed in what concerns course planning, implementation, monitoring and assessment of pedagogic experiments. This paper describes all these problems and proposes possible solutions based on empirical evidence of teaching classes with team work in the course with more students in the University of Minho.

Keywords: team work; learning attitudes; pedagogic problems

1 Introduction

The new process of adapting the courses to ECTS- European Credit Transfer and Accumulation System in order to fulfil the Bolonha Process arrived at a moment when many teachers were asking themselves what they could do in order to make the students more motivated to attend their classes. As mentioned by Powel in Pouzada (2002) the change of the methods of teaching to a method of cooperative learning work and by project highly contributes to solve problems of motivation, of innovation needs and the internationalization of courses. We do believe that this process, if well carried out, can be an answer to many existing problems. In times of change, many questions come up and induce reflection.

The adoption of the ECTS based on students work should not be taken as a formal change. For each curriculum unit, a number of ECTS was assigned that is based on the time that a student should allocate to achieve the required learning outcomes. The time allocated for each curriculum unit is a sum of the time spent in class, plus independent study and assessment. The change of theoretical and practical lectures into class time associated with independent time is an essential change since it allows a more effective teaching, being the teacher an inducer of knowledge and no more a transmitter of knowledge. This change should promote, on one hand, pro-activeness of the students to become more interested during the lectures, as they participate with their work and are more likely to put questions about the subject. On the other hand, they should be more aware of what is expected of them to do. The teacher now plays the role of motivating the students to learn by themselves. This new behaviour of leadership implies a profound knowledge of the human behaviour as described in Daniels (1994) but only some university teachers have been attending courses on methods of teaching/learning and applying those new techniques in their classes. The same applies to the students that should be aware of the time that they are expected to spend in independent study and this has to be well planed, so in this moment of change, students should be provided with short courses or manuals to help them cope with what is expected of them to do.

A recent study on Portuguese higher education students mentions the need to obtain a diploma and a successful career as the main motivation reasons to be at University. Nowadays, on one side more persons wish to have a degree course, and on the other side, the syllabus from the secondary school have changed a lot in the last years, and we cannot forget the fast technology evolution. All these factors are very much responsible for a wider choice of activities and ways to do things that may bring fuzziness into the choice of aims by our students. Motivation for hard work is difficult to achieve in modern times. In order to better understand this difficulty we must be aware of student motivations. They have to make too many choices, they have to decide in each moment what is best to do in order to fulfil the objectives they proposed for themselves. In this context of multiple demands, University students seem quite lost in the way to achieve their goals of success. It is one of the teacher's aims to give them back the joy of learning in a safe and stimulating environment as defended by Erlauder (2005).

It has been shown that the students are more interested, nowadays, in getting a degree than in getting knowledge. Therefore the question "How do we get the students to learn what we want them to?" arises. Thomas Shuell said in 1986: "what the student does is actually more important in determining what is learned than what the teacher does." So how can the teacher induce the student to work in order to achieve the intended outcomes? By lecturing about those outcomes? No, in a lecture the student simply listens and takes notes, with various levels of understanding. Then, the role of the teacher is to facilitate student learning. This role is carried out by both, the teacher's attitude and the way the curricula is presented. The next section discusses the teaching attitudes and afterwards in the paper, it is analysed how the curricula can be developed.

2 Teaching attitudes in order to activate students

Assuming that the teacher is the leader in the classroom, there follows the consequent idea that he must behave like that. As referred in Warren Bennis (1997) the qualities of leaders are, among others, the ones that: focus on people, inspire trust, have long-term perspective, innovate, ask what and why, develop, show originality, challenge the status-quo, have an eye on the horizon, be their own person. This implies that it is not the aim of this paper to give instructions for teachers to act as leaders; the basic goal is rather to discuss some general points that can improve the students' behaviour and, consequently, help them to be more responsible for their learning. The way in which a teacher applies these concepts is the one that is best suited to himself.

Daniels (1994) claims that behaviour is a function of its consequences. Many times we ask what happened before some behaviour has occurred when we should ask what occurs normally after that behaviour. When analyzing a performance problem it is necessary to determine if is a motivational problem (won't do) or a skill problem (can't do). Practically, to manage a behaviour it is needed a precise specification of what we want to improve, the development of a baseline of current performance against which we can measure progress, and then a precise intervention and the evaluation of its impact on performance.

At a first glance, it could be said that everything we do produces a consequence for us, therefore it is natural that: i) if we obtain something we like, we repeat it; ii) if we do not get what we like, we stop. But this is not so easily catalogued in i) and ii), because consequences change the rate or frequency of a behaviour. In order to obtain desirable behaviours from students, it is relevant to know that the behaviour consequences can be classified as: Positive reinforcement (if it increases the rate of the behaviour because we get something we want), Negative reinforcement (if it increases the rate of the behaviour because we want to avoid something we don't like), Positive punishment (if it decreases the rate of the behaviour because we get something we don't want) and Negative punishment (if it decreases the rate of the behaviour because we don't get something we want).

Since behaviour and consequences always come together we must understand how the first influence the others and vice-versa. The first step to understand behaviour is to know what have been the consequences experienced after that behaviour in previous times. The ABC (antecedent-behaviour-consequence) Analysis is a simple method for systematically analysing the antecedent and consequence influencing behaviour.

In ABC Analyses, consequences are classified in three dimensions: 1. Positive or negative. This dimension answers the question, "Is the consequence positive or negative from the perspective of the performer?" 2. Immediate or future. Here we want to know, "Does the consequence occur as the behaviour is happening (immediate) or some time later (future)?" 3. Certain or Uncertain. This dimension expresses the probability that the performer will actually experience the consequence.

The behaviour that occurs is the one in which the performer considers the consequence to be positive, immediate and certain. For example, in a very simple behavioural attitude, if a student is playing a game in the mobile phone, while in class, it is because the consequence is certain and immediate - he is enjoying himself now. If instead of working - as he should be doing – he is playing, it is because the consequence of better performance in the future due to hard work is considered as uncertain. So, in order to change this type of behaviour, one action could be to announce beforehand that all the students with this behaviour will have the gadget confiscated. Then this threat would be considered negative, certain and immediate, therefore the students will not play but, most probably, they also will not work as desirable (negative reinforcement). Other type of action could be simply ignore that behaviour and find an activity that the student considers enjoyable (positive reinforcement).

To be able to make a good ABC analysis is an indirect measure of empathy because in order to do so, it is necessary to classify the consequences through the eyes of the performer. Since a consequence considered certain will determine the behaviour the leader should be considered as trustfully, i. e., the change of behaviour in the long term depends on how it is possible to pair antecedents with consequences. In other words, to be trusted all you have to do

(consequence) is what you say you are going to do (antecedent). In fact, trust can be constructed every moment and it is very important in the relationship of the teacher with the students in the class. Once trust is established, people will give you the benefit of the doubt even if you make a mistake. If you are not trusted, they will not believe you even when you tell the truth.

In order to facilitate successful performance, it is important to understand and accurately measure leadership performance. As explained in George (2000) the mood of the leader influences the behaviour of the group, i. e., positive mood leaders transmit their mood to the group and the group tends to perform better and more consistent than those in which the leader is in a negative mood. A positive mood leader tends to give positive reinforcements and thus the response of the group is of better quality.

The first day of class is very important in order to define group's mood. The teacher's attitude in believing that the course will be well succeeded within a team work is a positive attitude. Working as a team will be the key to success, but there are pre-conditions: it is not a team if 1) the students work and the teacher is not there to guide, 2) the teacher guides and the students won't follow. A team means that all members work together in order to pursue a goal. As a leader, the teacher should have the ability to understand and manage the moods and emotions in the self and others, i. e., to master the emotional intelligence. If the leader allows the student's behaviour to influence his own behaviour, he loses the leadership and puts at risk the aimed goal. This is the case when a teacher is not able to control himself when a class is misbehaving. Most probably, the students do not understand what is expected of them to do and it is certain that their behaviour is going to have that consequence. Also, in the first day, the limits of behaviours should be discussed and defined, living no place for misunderstandings. This discussion also sets the tone for class dynamics.

There seems to be a need for university teachers to do team work deeper than the actual coordination of assessment moments (Felder, 2003) and have pedagogic support when planning learning activities and schedules. In fact, the normal teacher will not provide a new leadership in terms of individual student or team learning due to his (her) own lack of time and preparation. This is especially true in courses with many students where organization and dedication are crucial for any successful attempt to shift learning paradigms. The motivation task, alike for team learning or project approach, as the student is induced to learn by him (her)self and by sharing knowledge with other colleagues, is difficult to manage by teachers without technical support, pedagogic expertise and even more, without time to question present teaching attitudes. University teachers still work in a very lonely way and this lack of team work among them endangers the success of the Bolonha Process (Lourenço et al., 2007).

Each of us has a social personality as well as a learning personality that is different from everyone else. Our learning personality is the combination of natural talent, personal interest, current opportunity, social environment, character, motivation and how the brain processes information.

People, whose learning personality is in harmony with their social environment, are considered highly intelligent. People, whose learning personality is out of harmony with their social environment, are considered to have low intelligence.

The formal education helps intellectuals discover and develop their natural talent. The system does not do the same for non intellectuals. These students are labelled failures because they cannot perform like intellectuals. On the other hand, put these students in a social environment that is in harmony with their natural talent, suddenly, they become highly intelligent and excel.

Albeit social environments and talents can be divided into hundreds of categories, for comprehension´s sake four straightforward categories were established as can be seen in Table 1. The last one aggregates the varying others that do not fit into academic/intellectual, arts/artistic, mechanical/technical, physical/dexterity environments/talents.

In fact, an intellectual learning personality relates to superior motivation with academic subjects, because these students enjoy learning. They are highly motivated and their high grades reinforce their self-motivation to learn but they must feel challenges from the learning system. We agree that this is a strong component of university students learning types.

Teaching Engineering students, in particular, civil engineering, implies a relevant percentage of students with mechanical talent and skills, that is having a technical learning personality. These students take risk and learn by trial and error and so they should be allowed to experiment, in order to discover their true capabilities. Project work seems especially catered for their needs

Table 1 - Perceived Intelligence in Different Environments

Learning Type/Talent	Social environments				
	Academic	Arts	Mechanical	Physical	Other
Intellectual	HIGH	Moderate to Low	Moderate to Low	Low	Low
Artistic	Moderate to Low	HIGH	Moderate to Low	Low	Low
Technical	Low	Moderate to Low	HIGH	Moderate	Low
Dexterity	Low	Moderate to Low	Moderate	HIGH	Low
Other	Low	Low	Low	Low	HIGH

Source: http://www.motivation-tools.com/youth/project_education.html, *accessed at 2009.04.22*

Another relevant learning type is the dexterity learning personality that relates to the need to know "why," otherwise, the information is rejected. While the artistic talent if strongly dominant does not seem to fit in the engineering world, there will be some percentage of students in this set, apart from others who are not so easy to classify.

Here, another conceptual approach to learning should be introduced that is “constructive alignment”. This concept by John Biggs starts with the notion that the learner constructs his or her own learning through relevant learning activities. The teacher should be aware that the key aspect is that all components in the teaching system - the curriculum and its intended outcomes, the teaching methods used, the assessment tasks - are aligned to each other. All are tuned to learning activities addressing the desired learning outcomes. Then, if this occurs, the learner finds it difficult to escape without learning appropriately.

In brief, instead of controlling the performance of students, close supervising teachers should lead in such a way that they will condition students to assume responsibility.

3 Course Planning

The importance of course planning is increasing in the new Bolonha format compared to the previous format as students are supposed to learn in more independent ways, having the number and time duration of classes diminished. This section addresses the issue of course planning for two subjects, one in the first year – Mathematics - and the other – Urban Planning - on the fourth year of the Civil Engineering degree.

Course planning is an essential task, it needs the definition of the course objectives, of teaching and learning activities and of assessment methodologies. Explicitness of objectives gives the guidelines for both the teachers and the students in terms of learning outcomes. Assessment and learning tools have to be in tune with the objectives that should themselves contain statements which suggest the kind of behaviour the students will be required to demonstrate in order to show that those objectives have been achieved (Newble & Cannon, 1995).

It is also important to define if the teachers will only deal with behaviour concerning knowledge or also skills or even attitudinal. The knowledge behaviour incorporates six levels, according to the taxonomy of Bloom, from knowledge, comprehension, application, analysis, synthesis to evaluation or three subdivisions, recall of information, understanding and problem-solving, as recommended by Newble & Cannon.

The objectives should be derived from a careful analysis of the subject matter, what the lecturers know about students (knowledge, skills and attitudes) and about the subject (Newble & Cannon, 1995). Methods to achieve these objectives can be lecturing, small group teaching, practical teaching direct observation with feedback, preceptor system, independent work, field-work, peer teaching and a variety of simulation techniques.

The planning of a mathematical course for the engineering first year students takes into account the fact that they feel some times very disappointed since they do not understand the reason to learn mathematics. First year lecturers know how mathematics is important either in life in general as in an engineering course, but is not by telling that to a student that makes them more interested in the subject. The question now arises on how to motivate them to hard work in something they don’t feel as important. The mathematical concepts taught in first year are designed to train and develop proper thinking and to give the basis knowledge for later appliance. Sometimes, it is very difficult to find direct applications to subjects since their application requires a deeper knowledge of different subjects. To teach the

mathematical bases trough project base education seems difficult because of the given problems and as well because of the extended course subject. The solution to the problem seems to be active learning.

In active knowledge construction, knowledge is constructed with the activities the student does and not what the teacher does. In this process the teacher's task is to help students construct understandings instead of transmitting them. Content thus evolves cumulatively over the long term, having "horizontal" interconnections with other topics and subjects, and "vertical" interconnections with previous and subsequent learning in the same topic. The process of teaching is to help the learner undertake activities that involve progressive understanding of the meanings. The process is multidimensional, not linear: it is to intrigue the gourmet, not to sate the glutton (Biggs, 1994).

The horizontal and vertical connections of each subject enforces a well planed course, implying discussion with the teachers of the other subjects. These discussions need to take place in a systematic way, which has not been the case due to lack of time of the teachers involved.

In the experience carried out in the linear algebra and analytical geometry, the subjects were presented in a bloom taxonomy order. With this we mean that the presentation of the subjects is not done in a sequential order, as is usually founded in referential books. To start the students occupied to master the calculations, with exercises that prepare them to discover some properties. Then the curiosity to understand deeper the subjects is established and then properties and applications follow. The study to analyse, apply and relate the knowledge of different subjects is a natural step to carry out. This order is not completely linear, since we can not forget that each student is an individual with special type of learning. Nevertheless, not all of them are happy with basic learning and those who are should be pushed into a deeper understanding of the topics.

The assessments are planned in such a way that subjects are common to more than one assessment, but in a different level of knowledge. As said before the topics are aligned in the bloom taxonomy therefore, in the first assessment is mainly calculations of different procedures and some understanding. The next assessment comprises understanding and some problem solving, leaving to the third the interconnection between the topics. In this way, the student will master all the topics, since all the topics will be tested more than once, being the most important topics tested in all the three assessments at different levels of knowledge.

The other course unit, Urban Planning, previously a fifth year subject of the Civil Engineering degree, was passed to the fourth year, due to Bolonha re-arrangements. Also, due to this fact, the number of contact hours decreased and students start this subject without one subject that used to be taught in the previous year. In short, the course needed re-planning in order to cater for these shifts.

The planning of the new course took into account the lesser knowledge, the lesser age of the students and the lesser contact hours. The course keeps theoretical classes that appeal essentially to the most motivated hard working students with passive learning attitudes albeit the classes are structured around an interactive critical questioning but given at an auditorium. In the practical classes, students work in project based activities. In the last two academic years, the project had to be more closed and pedagogical exercises were introduced. This means that the project was pre-defined and the methods were pre-established, whereas previously the problem was partially defined and the methods were partially established in a partially open project.

Education that is based on projects is highly motivating and is man's natural learning process. The Project Based Education concept is based on what interests and motivates the student. Because the instructor cannot customize lesson plans for each student, he must implement student responsibility. It becomes the student's responsibility to develop the research project as well as a plan of action. The teacher acts as a coach or facilitator. This means that the teacher takes an interest in students' projects instead of students having to take an interest in topics handed down by the teachers.

Today's education system is based on academics and tests are used to gauge progress. A high percent of students are in tune with the current system, but there will always be the 30% who cannot associate classroom instruction with the real world. This is especially true for students with creative minds that are searching for alternatives. Project based education would solve this problem.

Projects require a goal where students must search for a method, acquire skills and knowledge, accept failure and bounce back from it, and keep trying until the goal is achieved. They learn through experiences and more important, they learn how to research and apply knowledge. Success is measured by the complexity of the project and the ability to finish it. This type of education motivates one to learn more about the world we live in while creating a lifetime love to learn as projects are learning tools that are motivated by curiosity.

A team of 5 to 8 members agree on a common interest project. With teams, the opportunity to share knowledge has a powerful influence on team members. It motivates others to find ways to contribute information or skills. When things go wrong, strong team members can support and encourage the weaker ones. Support from associates is a powerful force and peer pressure can motivate all to excel.

Projects make it possible to offer a wide variety of subjects, determined by the interest of the students. It becomes the students' responsibility to develop the project with available resources, not the teacher. But projects require a plan, which includes ways to acquire needed knowledge and skills.

4 Implementation of student activities

The solution to the problem on how to increase motivation for hard and independent work in the learning process depends naturally on the age of the students and also on their personal aims. The first case study presented here comes from the experience of teaching math subjects to first year students. The behaviour problems faced with these students are more concerned with motivational problems than with skill problems, since being the first courses in university the bases are not in general the problem. In fact, these freshmore are not used to, or motivated to, work hard within a relaxed not closely supervised environment.

Furthermore, they are not prepared to cooperative learning, in most of the cases. Teaching the basic mathematical concepts is particularly difficult since the student does not see the immediate application of those concepts. Although this is a fact, our experience has shown that introducing the concepts with some application to their future life and the mathematical theoretic in a way that can solve the problems at stake in a more efficient way has fostered a higher motivation in the student. But that is not enough, per se.

As referred before, it is what the student does that define what the student learns, thus the classes are carried out with the teacher behaving as a conductor defining the times that a topic should be mastered. The methodologies advised in Felder (2006) are very important to this kind of behaviour. In sum, what Felder advises is to propose to the students a simple question that they try to answer in class in groups of two or three and after a few minutes all the class discusses what the solution to the question is. To follow this methodology the classes are no longer divided in theoretic and theoretical–practical, they are just contact classes. In contact time a topic is launched and questions are proposed in order the student start to understand the topic at different levels of knowledge.

In order to get them acquired to cooperative learning that is very used in classes, they are induced to discuss the problems presented between themselves, in groups of two or three, and then discuss the result to the class. Explaining the problems to each other is highly encouraged in almost every class. This method keeps the student active in class and forces him to work together with other students. In this way the classes became more appealing and the student realises the benefit of working together, leaving the students to follow this behaviour outside class and to study along the course.

In first class the intended learning outcomes will be explained in a brief way, since it is difficult to fully understand what is not yet known. But presenting the outcomes in the bloom taxonomy, allows the students to realise what is expected from them, which is more than just learning procedures and memorize a few formulae. In order to reinforce this idea, the classes are carried out with student activities that make them experiment the high level of knowledge that is expected from them.

The alignment of classes is such that the easiest concepts for doing calculations were the first to be introduced. Since these calculations were easy to learn, the students started to be motivated, and then it was not difficult to move them to deeper thinking procedures in order to apply the acquired knowledge to different situations. It is already possible to conclude that this kind of step by step approach fostered a better apprehension of concepts.

The basic procedures in the first part of the course are presented with applications to the future life as civil engineers in order to motivate them and to build their confidence. After being able to master the procedures they can come to apply those procedures into problems, deciding case by case which procedures are more appropriate to the situation under study. In this way, it is expected that the student be able to connect and associate the subjects taught.

The activities proposed during class are group activities in order to encourage them to do cooperative and team work. Several times, explanations are given to a group and then these students are asked to explain to other groups of students. This procedure is especially important when dealing with large classes, when it is impossible that the teacher reaches all the groups. Obviously, when and if doubts still persist the teacher has to find time to explain. In the end of the class, the students are prepared to single out and discuss the important points. Then, new activities to deepen the

knowledge in the subject are proposed to the student to be carried out during their independent time study. These activities can be either performed alone or in group as more advisable.

Maintaining the student active in class improves their knowledge, since it is what they do that determines what they learn. Discussing the subjects between themselves improves their thinking in a relaxed way, as they are less afraid to make mistakes with their peers. Immediate positive reinforcements are more likely to happen since they discover that they are capable of discussing with each other. In consequence, they feel more prepared to do the assessments since they work in problems alike. This means that the levels of knowledge that they are expected to acquire are the ones that they train during lecture time and independent study.

Turning now to a description of the activities undertaken at the 4th year subject, Urban Planning, under practical classes as mentioned in the last section, they evolve around simulation scenarios and urbanisation proposals for an existing area not far away from the University. The difficulties presented by the selected area vary from year to year but the level has been decreased in order to cater for the lesser knowledge of present-day students which are no longer fifth year students. The average number of students per team continues to be eight students which has probably to be lowered to six members but the total amount of students per class has not yet allowed this down sizing.

Students have to make a diagnosis for the area which is discussed and framed by topics. Each topic is dealt upon choice by each team of students and after a given time, topic analyses are exchanged between all teams so that all students can make a global diagnosis of present situation. This sharing activity allows interaction between teams and indeed a better overall performance as sector analyses could reach a detailed level that will help more effectively team work at the time of making proposals.

The joint field trip, the open possibilities for choice, all concurs to motivate the majority of the students. Intermediate oral and visual presentations foster the adequate level of progress for the vast majority of the teams, enabling healthy competition and critical evaluations.

In former years, the level attained by the sketched proposals was good, in general, with some of them reaching professional status. This high level resulted from the joint work by many students while in the real world, professionals are many times working isolated and subject to plot property constraints. Some old students talk about their proposals being better than the ones that actually took place on those sites and this message is carried over the years.

But with the lesser age and knowledge of present students, the quality of the proposals has naturally come down. So, the challenge now, is while keeping the freedom of choice and action of the students so that they can enjoy the work they are carrying out makes a compromise with the obvious student limitations.

In brief, both subjects portray engagement in constructive in addition to receptive activities. Constructive activities involve (Biggs, 1989):

- a positive motivational context, hopefully intrinsic but at least one involving a felt need-to-know and a aware emotional climate;
- a high degree of learner activity, both task-related and reflective;
- interaction with others, both at the peer level with other students, and hierarchically, within "scaffolding" provided by an expert tutor;
- a well-structured knowledge base, that provides the longitude or depth for conceptual development and the breadth, for conceptual enrichment.

5 Discussion of results obtained

Assuming that learning with responsibility is the future, as society is becoming too complex for authority control to be efficient, it is obvious that leadership cannot comprehend, let alone implement, the wide variety of alternatives available. This is valid for the world at large and also for the academic circles. People with hands-on involvement are the best ones to explore ways to be efficient, but the system has to be organized to allow students to take responsibility. Likewise teachers have to give up control and find increasing ways to delegate responsibility to students.

In attempting to do so, it is important to highlight what are outdated beliefs as the ones that all university students can learn in a passive environment as a significant part of them cannot. And so, the old assumption that academics must be mastered before other opportunity is offered is not universal as some people learn by doing. Putting a

diploma on a pedestal, thinking that it is the most important tool to present to the market has been a constant in the Portuguese society. But this obliterates the importance of attitudes, namely the relevance of displaying more positive self-esteem and a commitment to action in the real world.

This paper presented course planning and implementation of student activities for two courses of the civil engineering degree – Mathematics and Urban Planning. Despite different approaches, the basic conceptual framework of learning has strong similarities in the sense that it is attempted in both to delegate learning responsibility to students. And both courses do not undertake the last degree of responsibility which is allowing students to assess their performance.

Peer-assessment of experiments has not been carried out formally as in previous times in another subject (Van Hattum & Lourenço, 2006, 2008). Lack of pedagogic support, mostly and in part, lack of time, explain this fault. Likewise, the questions remain: How do we know how well the student has done the applying? By getting them to write an exam paper on application? The answer is negative, as what is important is to check how well they have applied the principle in the case study, perhaps in a different situation. "Exam" is only one sort of assessment task and not one best suited to assessing many high level outcomes. Frequently, the most important outcomes are about behaving differently, making informed decisions. In fact, many times given exams most easily assess how well students remember what they have been told or what they have read. But they do not provide evidence on how the students can use the topic to inform their behaviour.

In sum, the achievements obtained in the mathematics and urban planning courses were to get them acquainted to cooperative learning. In the first course, students are induced to discuss the problems presented by the lecturer between themselves, in groups of two or three, and then discuss the result to the class. In the second course unit, students find problems in team work and they come with these problems to the lecturer when they cannot solve them.

A first monitoring and reporting of the learning processes of fourth and fifth year civil engineering students show surprising results in team learning evaluation. In fact, evidence from 4th year students have recently achieved problematic results in many subjects where team learning or group work has been introduced for a long time in the corresponding subjects. The reasons can be many, among them the reduction of lecturing hours and "laissez faire" attitudes from students as well as the overwork schedules and busily dispersed activities faced by university teachers at this turning point times. These reasons are similar to others described by students at Porto University, even at other courses not involved with engineering studies.

Nevertheless, more lasting outcomes can only be assessed in the next years and in other subjects if students are able to apply the acquired knowledge and the proactive attitudes.

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