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University Students and Sustainability Skills in Occupational Health and Safety Master Degree

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Abstract

Education is one of the key instruments to achieving global sustainability. In fact, sustainable development has to be integrated into higher education curricula. One of the difficulties of this challenge is to know if students are able to achieve the basic skills, something that is extremely important in emergency management. Thus, assessment of student's work outside the classroom, non-formal curriculum, is essential to adjust the subjects of education for sustainability to the philosophy of the European Credit Transfer System (ECTS) credits.

This pilot study details the measurements of the self-reported time spent by the students in different activities associated with sustainability, study habits, integration of new technologies and use of support material. Moreover, the students' motivation and satisfaction with the course was also analysed. In this regard, two challenges were identified: teamwork and getting a better study organization.

Keywords: education for sustainable development, disaster risk reduction education, motivation, time management, university students

1. Introduction

The UNESCO (Resolution 57/254 United Nations General Assembly), seeks to mobilize the educational resources to develop a sustainable future (Mulà & Tilbury, 2009). Thus, it is necessary to propose teaching and learning of sustainable development in order to reach that goal. Educating, along with anticipating and informing, are the keys to reduce fatal effects of natural disasters (Padli, Habibullah, & Baharom, 2010). Although there are different interpretations of sustainability, the most popular one describes this term based on three pillars: economy, environment and society (sustainability Venn diagram) (Parkin, 2000). This model proposes that environment is the most relevant pillar of sustainability. However, all elements are interrelated, so weakness in environmental management should be reinforced with developments in society through changes to culture by education. Therefore, Education for Sustainable Development (ESD) implies to incorporate fundamental knowledge that allows reducing disaster risk, among others (Sterling & Thomas, 2006). In other words, it is necessary to apply teaching-learning methods that help the students to modify their behavior and to develop activities related to sustainable development.

This paper will focus on education for Disaster Risk Reduction (DRR) based on a pilot study. The term DRR, as an ESD, includes the relationships between society, environment, economy, and culture (Kenny, 2012). All ESD models suggest an interdisciplinary approach and modifications in pedagogy regardless changing curricula (Burmeister, Rauch, & Eilks, 2012). DRR encourages critical thinking of vulnerable or affected groups by catastrophes. Anticipating, educating and informing are the keys to reducing the deadly effect of such natural disasters.

Recent major disasters around the world showed the existence of action and coordination conflicts when managing an emergency (Benadusi, 2014). These were mainly due to the lack of trained professionals on this issue. As a result, many universities throughout the world started offering a master degree in Disaster Risk Reduction (DRR) (Somers & Svara, 2009). These types of courses provide an understanding of hazards, vulnerability and the risk of disaster as well as emergency management such as planning, logistics and/or

response. Almost all of these masters have teaching modules related to legal bases, organizational and human resources management and risk analysis. It should be noted that in Spain the number and the scale of disasters is not comparable to other areas of the world. Nevertheless, the number of people affected and killed by disasters should be further reduced. In this regard, there are very few masters in Spain covering this subject. Occupational hazards prevention or Occupational safety and health prevention are the two master themes in Spain related to DRR. One example is the Occupational Hazards Prevention master of the University of Vigo where this study was performed.

The adaptation process to the European System of Higher Education Area (EHEA) requires the determination of the students' time and effort to achieve the objectives of the course set out in the syllabus. For many years, the Spanish educational system used a memory-based method with low active student participation that frequently concentrates the study load on dates close to the examination period. As a result, students gained deep theoretical knowledge, but they lack important skills for their professional future. It has been necessary to change the educational system in order to develop a more competitive society in times where globalization requires new technologies command and critical thinking and problem-solving skills. In fact, the development of thinking is a critical point in education associated to sustainability (Thomas, 2004).

It is even more important to provide and to ensure that students acquire basic skills when talking about DRR education. In this respect, time management is a key skill. In order to achieve this, time management capability has to be analyzed. It is also essential to know how much time students are able to maintain sustained attention while studying the course. Because of this, the purpose of the generation of syllabus is that students acquire basic skills, especially if we consider that their professional future will be related to risk management.

The concept of time management is defined as a set of behaviours that are supposed to facilitate productivity or effectiveness and help manage stress (Lay & Schouwenburg, 1993), which for some authors is part of a neoliberal ideology (Pearce & Down, 2011). This term is applicable to all fields, including university. Thus, time management is one of the biggest topics in the learning process and study strategies (Xiong, A. Wang, L. Wang, & Yu, 2014; J. Xu, Yuan, B. Xu, & M. Xu, 2014). According to several authors, an efficient time management may be critical to academic success (Indreica, Cazan, & Truta, 2011). Moreover, well-organized time management may help students to become aware of their own study habits, improve their self-regulation of time, reduce stress levels and increase their self-efficacy. However, when asked about problems in managing their time effectively, students usually point out that there are many tasks, classes and exams, many of which demand a lot of time (Nadinloyi, Hajloo, Garamaleki, & Sadeghi, 2013). Thereby, one essential skill for university students is learning how to manage their time (Albaili, 2003).

The traditional teaching model is built on the transfer of the teacher's knowledge in lectures (Tao, Ramsey, & Watson, 2011). In the EHEA, knowledge is acquired not only in the classroom but also outside it reading assignments, preparing exams and doing extracurricular activities, supported by computer resources and new information and communication technologies (Britt, Sellinger, & Stillerman, 2002; Eamon, 2001; Gomez, Caja, Barajas, Maresca, & Berzal, 2008). In this context, teachers impart knowledge, provide guides and schema and motivate students to achieve a meaningful learning. Therefore, student assessment comprises both attendance working and non-attendance working and, as may be expected, non-attendance working is more difficult to quantify. In recent years, a research line into students' effort assessment has been developed. Effort is defined as the sum of the study time outside and in the classroom, both individually and in a team (Kember, 2004). Most of the studies conducted to determine students' perception were based on their opinion of the workload (L. Bachman & C. Bachman, 2006; Reisslein, Tylavsky, Matar, Seeling, & Reisslein, 2007). In this regard, Moseley (2010) and Li (2007) noted that listening to the students' opinions is a key factor to address their needs in the learning environment.

With this in mind, the main objective of this study is to know if students acquire key skills related with DRR education in the Occupational health and safety master degree.

2. Materials and Methods

During the 2012–2014 academic years, a pilot study was developed to find out the Occupational health and safety master degree students behaviour and workload. The subjects analysed are shown in Table 1, and basically are divided in compulsory or optional. This implies the involvement of different teachers of the master. Students were asked to voluntarily participate and the resulting group of participants comprised 70 students (42 women and 28 men). Although some studies used the stepwise regression approach or web questionnaires (Michinov, Brunot, Le Bohec, Juhel, & Delaval, 2011; Ramos & Yudko, 2008), in this case an in-person survey approach was chosen. The survey was performed following the EMID questionnaire (Assessment Model of Teaching

Innovation) (Bono, Arnau, & Blanca, 2004). This model is ideal for this project because it was designed to assess the following: student behaviour, study in groups, support material use and degree of integration of the ICT. However, it was necessary to adapt this model to the peculiarities of the present case. For this issue, the Thurstone's procedure was applied with 10 judges (i.e., 10 professors with experience in teaching risk management), blind to the research aim, that assessed in a 11 point scale (from totally in disagree to totally agree) a pool of items (taken from the EMID questionnaire) about its pertinence for evaluation of students behaviour and workload. For this procedure, judges evaluated consistently (interquartile range < 1) as applicable (M > 10) for the evaluation of the items.

Table 1. Description of the courses (ECTS: European Credit Transfer System)

Subject	Characteristics	Teaching load
Occupational health and safety basis	Compulsory	3 ECTS
Risk prevention management	Compulsory	6 ECTS
Occupational safety specialism	Optional	6 ECTS
Industrial Hygiene specialism	Optional	4.5 ECTS

Surveys were collected at two different times; compulsory subjects were evaluated in December and optional subjects in May. The main reason to choose this data collection was that the compulsory subjects were taught during the first semester whereas the optional subjects were taught during the second semester. The advantage of this system is that the student is able to exactly report the study hours dedicated.

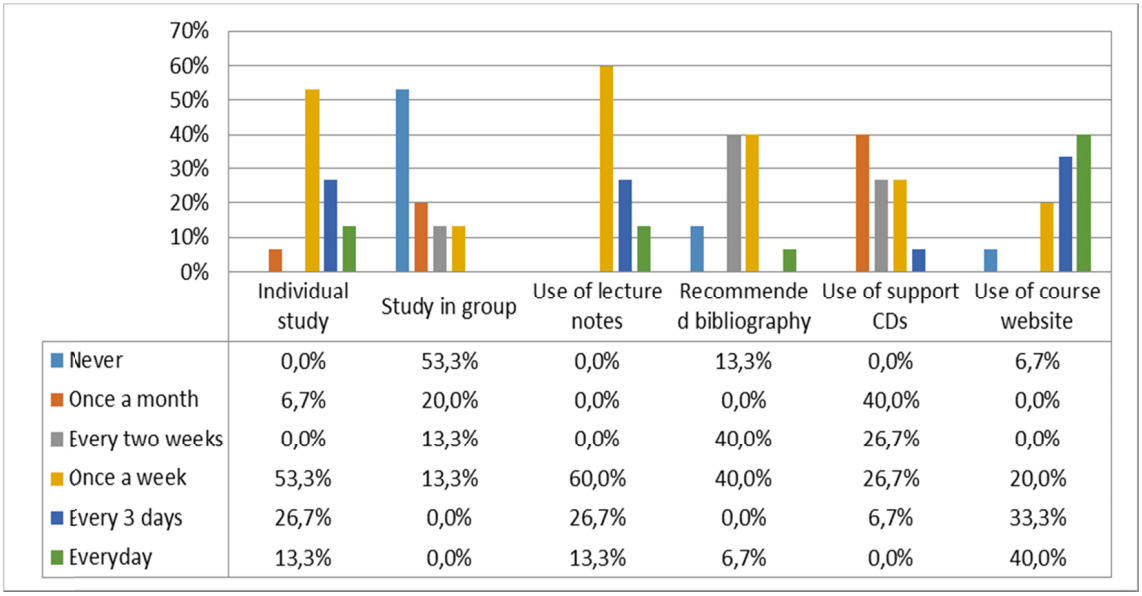
The survey about the behavior of the group of students when facing some topics was gathered in 6 blocks. Basically, each topic deals with the use of the means provided by the professor, the repercussion of the materials and ICTs and the study habits. The students have to choose how often they carry out the tasks associated with each topic, using a scale in which the maximum is "on a daily basis" and the minimum corresponds to "never". That is, the participants had to answer the questions using a Likert six-point response scale. These data may help the lecturers to develop a new pedagogical framework.

Because motivation is one of the most important factors in the study performance analysis, the curricula is based on different elements (i.e. lecture notes, multimedia CD, online tests on the website of the Master). Nevertheless, it is difficult to design valid indicators of motivation (Bugge & Wikan, 2013). Thus, several questions of the survey were focused on the motivation assessment, that is, how motivated the students were to work with the subjects.

3. Results and Discussion

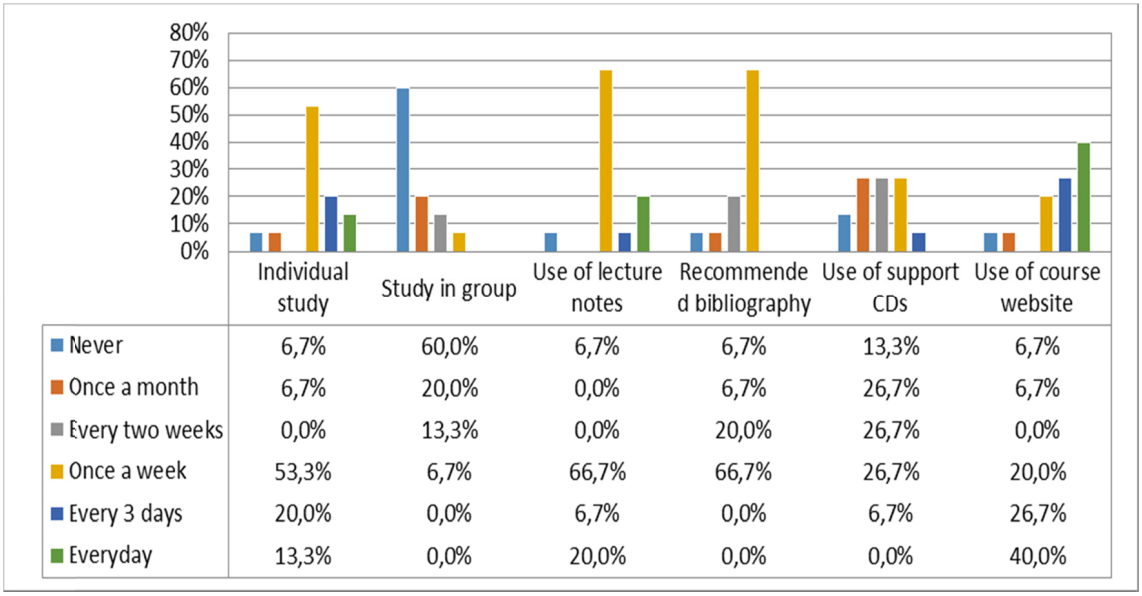
Figure 1 shows an encouraging trend: almost all respondents study at least once a week. This result agrees with Krohn and O'Connor work (Krohn & O'Connor, 2005). Furthermore, a high percentage of the students surveyed indicate that they use the recommended bibliography, suggesting that the provided material is attractive and useful. However, something really negative is the lack of group study (Never, more than a 50%). If the scale is divided in two blocks (never/not often) or (sometimes/often) the difference is higher: more than 85% do not usually study in a group. Teamwork is one of the most beneficial activities for the student, since important skills for their professional future are developed. This finding is coherent with a recent comparative study carried out in Europe (Brennan, Patel, & Tang, 2009) where students from countries on the educational frontline (i.e. Finland) reported greater emphasis on group work than other countries such as Spain. Perhaps the most striking feature of this study was the low reliance on teachers as the main source of information.

The website usage seems consistent with what would be expected, perhaps slightly inferior considering that the students have there all their course materials. Even so, something disconcerting is that only 10% of the students stated never using the web. Finally, the students prefer the traditional class notes rather than the CDs.



	Individual study	Study in group	Use of lecture notes	Recommended bibliography	Use of support CDs	Use of course website
Never	0,0%	53,3%	0,0%	13,3%	0,0%	6,7%
Once a month	6,7%	20,0%	0,0%	0,0%	40,0%	0,0%
Every two weeks	0,0%	13,3%	0,0%	40,0%	26,7%	0,0%
Once a week	53,3%	13,3%	60,0%	40,0%	26,7%	20,0%
Every 3 days	26,7%	0,0%	26,7%	0,0%	6,7%	33,3%
Everyday	13,3%	0,0%	13,3%	6,7%	0,0%	40,0%

Figure 1. Study frequency (Compulsory subject)



	Individual study	Study in group	Use of lecture notes	Recommended bibliography	Use of support CDs	Use of course website
Never	6,7%	60,0%	6,7%	6,7%	13,3%	6,7%
Once a month	6,7%	20,0%	0,0%	6,7%	26,7%	6,7%
Every two weeks	0,0%	13,3%	0,0%	20,0%	26,7%	0,0%
Once a week	53,3%	6,7%	66,7%	66,7%	26,7%	20,0%
Every 3 days	20,0%	0,0%	6,7%	0,0%	6,7%	26,7%
Everyday	13,3%	0,0%	20,0%	0,0%	0,0%	40,0%

Figure 2. Study frequency (Optional subject)

The results of the basic subject and the optional one are quite similar. It is worth highlighting the difference between the bibliography enquiries which is considerably more frequent in the optional subject. The students are more interested in studying in depth topics chosen by them. This disagrees with other research papers which relate high levels of difficulty with more time spent studying (Krohn & O'Connor, 2005; Perdian, 2013). In the present case, due to the similar results between the compulsory and optional subjects there will not be distinction in the remainder of the article.

Lecture notes are the most frequently resource used. It is perhaps paradoxical, but there are papers that indicate a negative perspective of technology usefulness (Ng & Gunstone, 2002). This issue is particularly related to older students, such as master's degree students.

The time at which the students get tired of studying is a key issue in sustainable education; thus, it was also studied. A t-test performed with SPSS was used in order to analyze the output of study frequency (Table 2).

Study frequency was assessed into a 5 point scale (from study less than 15 minutes (1); 16-30 minutes (2); 31-45 minutes (3); 46-60 minutes; to study more than 60 minutes (5)).The test value was the midpoint of the scale (31-45 minutes). The results showed that student population mean is in the midpoint, an average between 31 and 45 minutes. As might be expected, no significant differences inter-groups were found ($p > .05$). The fact that students are not enough motivated and get tired of studying some subjects, means that meaningful learning will not achieved. Therefore, if meaningful learning is not achieved, consequently critical thinking abilities for sustainable education are not developed.

Table 2. Variables' descriptive statistics of study frequency of compulsory and optional subjects–Test value 5. (df(69))

Variable	*A*	*t*	CI 95%	
			Lower	Upper
Compulsory subjects	3.09	.45	-.26	.43
Optional subjects	3.17	1.10	-.14	.48

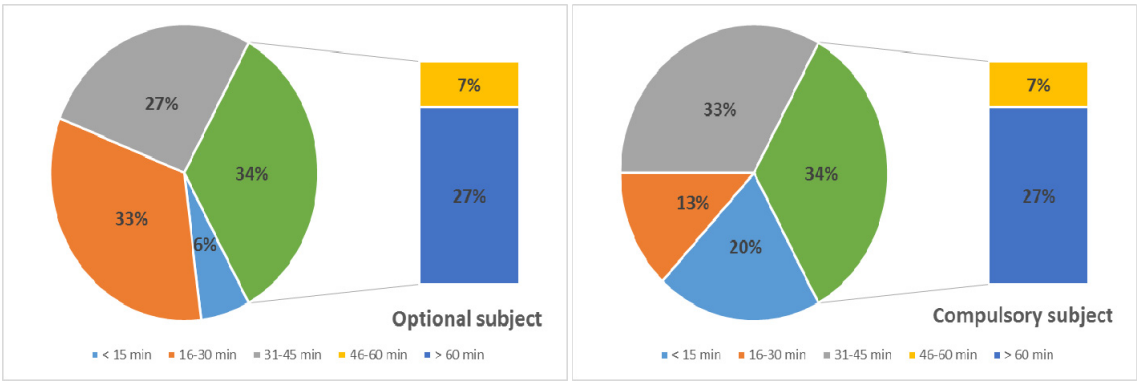


Figure 3. Study frequency (Optional and Compulsory subjects)

Secondly, the participants were required to indicate the number of hours spent in a range of activities more specific than the previous. In this case, the scale is established between the minimum 0 to 5 hours and the maximum more than 20 hours. Furthermore, the group is divided between male and female as well as the employment status. The students are asked to reveal whether the devoted time to every issue is still the desired once the results are obtained. Regarding the hours students devote to reach the minimum knowledge base, different behaviour between men and women was found. While men condense their activity in the 0-10 hours range, women broaden the range (Figure 4) are divided among the following ranges. However, both sexes agree, in the same proportion, that they should have studied more, specifically the double (Figure 5), or either because the results were not the expected ones (improve marks) or because the concepts were not assimilated as desired. Finally, it is also worth noting unemployed people think that they do not study as much as they should.

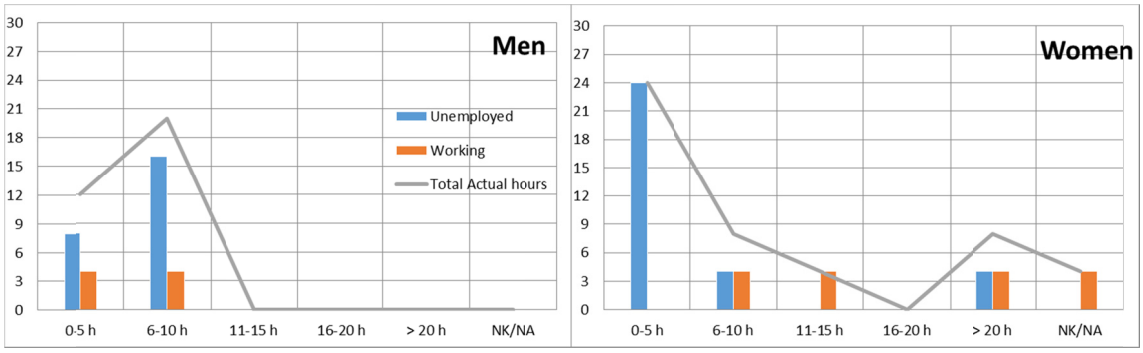


Figure 4. Actual men and women individual study (basic concepts)

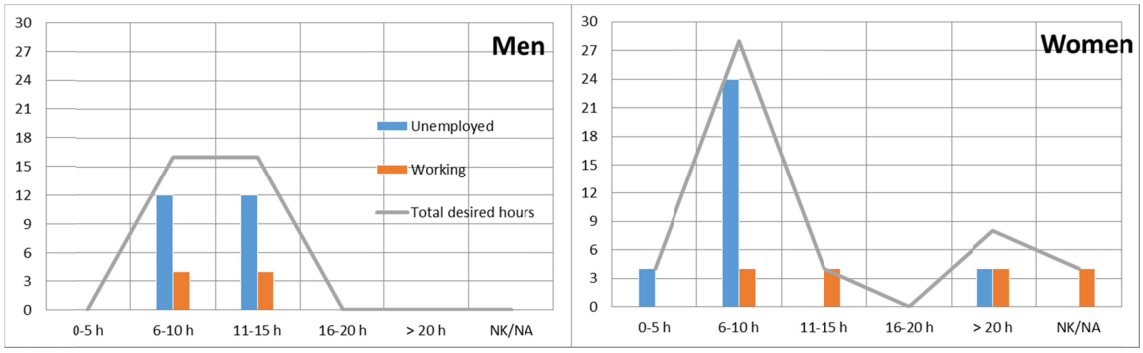


Figure 5. Men and women desired individual study (basic concepts)

Actual and desired devoted time by occupation was compared, in order to know the effect of work in study time (Table 3). As indicated above, it is noteworthy that students who combine studies and work spend less hours studying than those who only study (Beerkens, Mägi, & Lill, 2011). Summarizing, the results show that students group who are unemployed manage their time significantly better that the students who work group, with a medium effect size (Cohen's d < .8).

Table 3. T-test with independent samples–Actual and desired devoted time by occupation (df(69); *= p < 0.05)

Variable	t(df)	A_u	A_w	Cohen's d
Actual devoted time	3.19(74)*	2.60	1.65	.63
Desired devoted time	2.56(74)*	3.00	2.36	.78

Note. A_u: Average unemployed; A_w: Average working.

With regard to students' behaviour before the exam date, the actual amount of hours devoted to study increases noticeably. Approximately 60% of men and women respondents spent less than 11 hours studying during these dates. Men admit that these hours were not the appropriate, and up to 90% of the male students said that they should study at least 11 hours. However, women vary their behaviour much less than men (Figures 6 and 7). Once again, the students that have a job are not willing to increase their time of study. Nevertheless, with a better schedule of the workload as well as distributing the hours along the course instead of concentrating the study time in the previous dates of the exam, the student would not have the feeling that is lacking hours. Actually, one of the new educational system main basis is to avoid this tendency, as concepts are better assumed gradually. Moreover, if the lecturer wants to ensure that the students acquire the DRR competences, they have to reinforce regularly studying techniques, otherwise. Otherwise, meaningful learning will not be achieved. If compare students behaviour by gender (Table 4) found that women manage better their time than men, with a medium effect size. That is, the actual devoted time is quite similar to the desired devoted time. These results may be

influenced by occupation; the proportion of women who combine study and work is higher than men proportion.

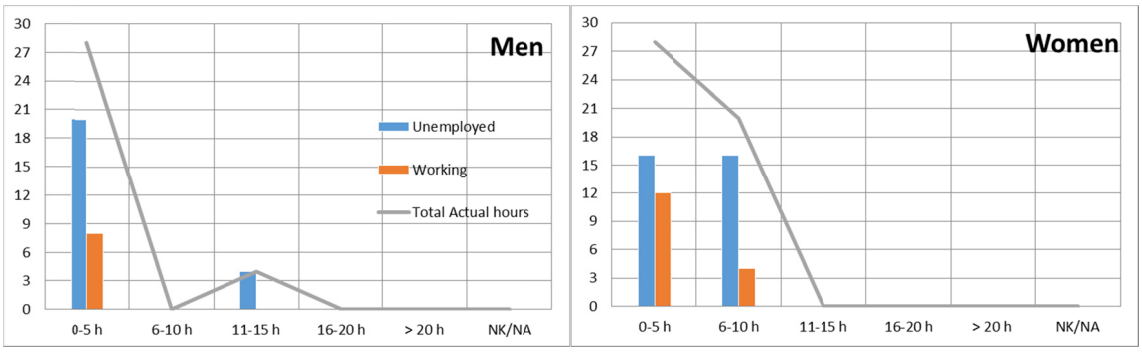


Figure 6. Students' behaviour regarding the devoted time before the exam

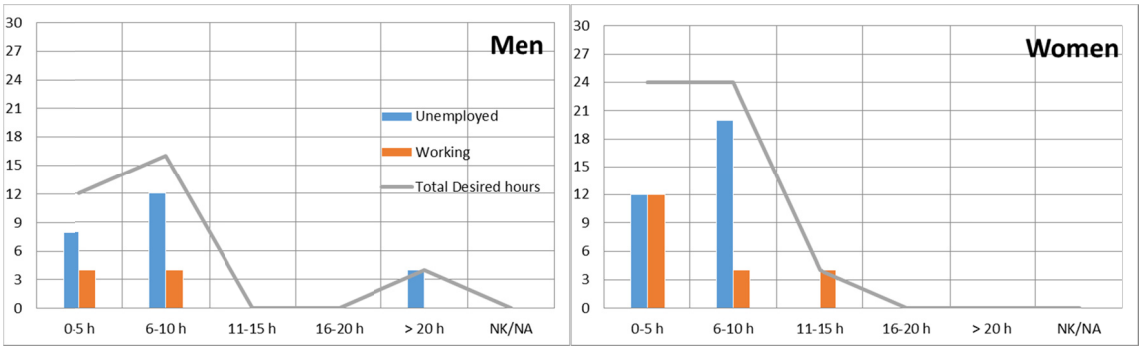


Figure 7. Students' behaviour regarding the desired devoted time before the exam

Table 4. T-test with independent samples–Actual and desired devoted time by gender (df(69); *= $p < 0.05$)

Variable	t(df)	A_w	A_m	Cohen's d
Actual devoted time	2.90(78)*	1.42	1.12	.70
Desired devoted time	-2.50(78)*	1.50	2.00	.53

Note. A_w: Average women; A_u: Average men.

Unsurprisingly, students who work devoted less time to study, so the degree of involvement is lower than unemployed students. That is, the time spent on paid work influences negatively on the academic performance (Beerkens et al., 2011; Bugge & Wikan, 2013). The undesirable side-effect of combining work and education is less time to study, which may imply a reduction in studying progress (Vossensteyn, 2009).

When participants were asked about the devoted time in every study session, the differences between men and women's behaviour reappeared. In fact, 90% of men spent at least 5 hours in every study session whereas 40% of women devoted between 6-10 hours. Otherwise, the desired behaviour in devoted hours changes considerably more in the case of men, with more than the 50% of the respondents assuming that they should spend up to 10 hours. This is associated with best habits to assimilate the subjects' contents.

The final part of the survey evaluated the students' satisfaction with the course and their feelings about learning strategies. This is necessary to know in which conditions the study was developed. The established five-levels scale goes from strongly agree to strongly disagree with the proposed statement. Although 18 different statements were raised, in this paper only the 6 most important will be showed, as they collect the general idea.

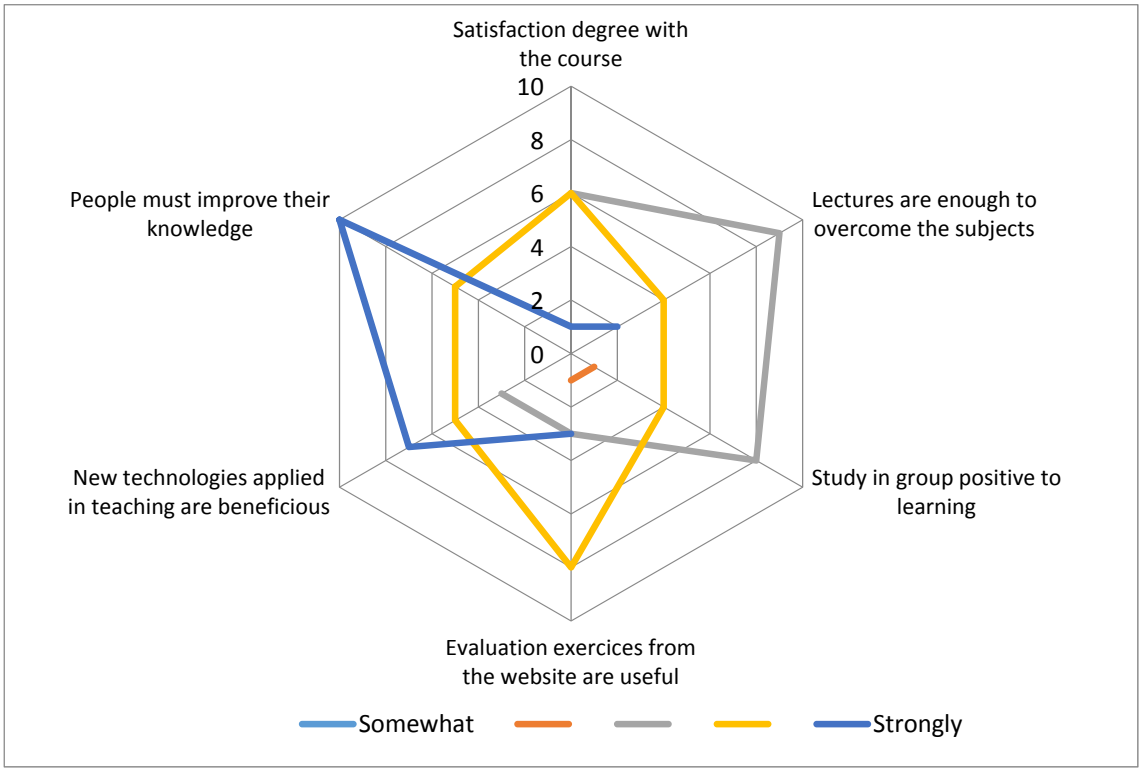


Figure 8. Students' opinion in some matters

The most important conclusions extracted from Figure 8 are, first of all, despite the fact that the majority of students do not usually study in group, they consider the teamwork profitable for learning. Furthermore, regarding the lectures and supported material provided by teachers, these are considered as adequate and useful to overcome the subject. New technologies have a big reception among the respondents. They recognize that people should update their knowledge in any field, suggesting a proactive mind-set.

Based on the results from the survey, important conclusions can be obtained. First, significant differences were not found when comparing the habits of the students when studying a compulsory or an optional subject. Furthermore, the integration of the ICT seems to be almost complete and the teamwork emerges as one of the biggest challenges for the next years. Indeed, different studies showed that students learn by experiences that are better to practice in groups, because DRR is a social issue (Prasetio, Arifianti, Hardjakaprabon, & Agustin, 2012). Moreover, ESD and DRR should respond to critical contemporary issues as ICT (Selby & Kagawa, 2012). Finally, the students consider that it is beneficial to study in group despite not practicing it. So teachers should make an effort to encourage their students to do some teamwork through different activities. Another big challenge is getting a better study organization along the semester as it is shown in the survey.

In summary, due to the fact that the results of this pilot study are limited by the small size of the sample, the findings cannot be generalized. However, this students' perception shows the weaknesses inherited from the old educational system and allow us to know which improvements are needed and, most importantly, how to help the students to achieve a successful methodology for ESD. Needless to say, the arguments to introduce sustainable education in all educational stages are clearly supported. These findings could be significant on two levels: to provide instructors some evidence about how students perceive the usefulness of the educational methodologies and to know the perceptions of the participants based on a series of characteristics (i.e. gender and employment rate). Student feedback, especially in terms of time management and workload, may led to changes in the existing curricula (i.e. team work activities or new assessment procedures). These changes, together with DRR courses, aim to contribute to academic development, linking sustainable development issues with higher education plans unlike other curricula with explicit links to the principles of ESD. These principles include skills such as knowledge integration and education throughout life, which are promoted in the masters' degrees.

It is also important to highlight that the goal of DRR education is to increase the students' capacity to cope with disasters through fundamental knowledge and skills (Shaw, Mallick, & Takeuchi, 2011). Although in order to

teach the students these principles, many activities were proposed in the curricula, these experiences will not become meaningful learning if the study techniques are inappropriate. In this pilot study, the DRR education is under formal approach, so ensuring that the graduates become qualified professionals is crucial. Basic education is not enough to provide knowledge (Sharma, 2005). Furthermore, when the study shows the factors that limit the adoption of effective strategies against disasters, the lack of DRR education is identified as the first factor (Ibem, 2011). In this regard, Agenda 21 was the first international document that recognised education as key tool for EFS and highlighted DRR as an area of action.

4. Conclusion

The research shows that the stress generated by lack of time to fulfill the academic activities produced in the university students symptoms associated with the lack of motivation. This state affects students' academic performance. Indeed, it has been shown that motivation and emotional exhaustion interfere with basic executive functions related to the processing of information (Hanus & Fox, 2015). The deficit in any of these functions necessarily lead to a reduced capacity for analysis and synthesis. As can be expected, this will lead to the success rate of the Degree. Academic stress triggers take place in the work environment, so the prevention of this syndrome requires an organizational and methodological intervention within the center. Thus, with the goal of improving the quality of university education and welfare of the student, in this paper the action steps proposed are: 1) to evaluate the adjustment of the student's workload to the course credits; 2) to standardize criteria to estimate the time of study; 3) to develop strategies for collaborative work and horizontal coordination between teachers of the same course to adjust the workload to the real-time availability of students. In conclusion, the department cannot guarantee that the students acquire a solid foundation in key skills related to Education for Sustainable Development (i.e. education for disaster risk reduction) if they are not provided with materials tailored to their needs.

Moreover, these results, as other studies, suggest a significant change is needed to develop associated ESD pedagogic approaches and the capacity to link DRR and ESD among teachers (Burmeister, Schmidt-Jacob, & Eilks, 2013). Lecturers have to contextualize the contents to work through disciplines, using the DRR course as a way to apply new pedagogical methods (i.e. activity-oriented) that combine with traditional approaches. The success of DRR course is determined by tasks that conform the curriculum through engagement with students and academics from a pedagogical and industrial, in this case, perspective. Thus, new approach that increases learning spaces and facilitates real life experiences through group activities is needed. Since lectures usually that take place in spaces that have any relation to subjects' contents.

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