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MEMORIA FINAL

Actuaciones Avaladas para la Mejora Docente, Formación del Profesorado y Difusión de Resultados
Modalidad C

Identificación de la actuación	
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Título:	Implementation and analysis of new learning activities in the context of different degrees: relationship between both factors

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1. Describa la contribución a la actuación de cada uno de los participantes. Copie y pegue las líneas que necesite para contemplarlos a todos y disponga del espacio que necesite.

Apellidos y nombre:	Arellano López, Juan María

Como participante en el proyecto ha llevado a cabo las siguientes actividades:

- En la asignatura Laboratorio Integrado de Bioquímica y Toxicología (Lic. Química, cod. 206016), ha participado en la puesta en práctica de actividades académicamente dirigidas bajo las siguientes modalidades: realización por parte del alumnado de cuestionarios on-line; elaboración por parte del alumnado de la asignatura de bases de datos de posibles preguntas de examen; y presentación oral de la práctica/as realizadas en la asignatura.
- Elaboración de los resultados observados en las distintas actividades académicamente dirigidas puestas en práctica.

Apellidos y nombre:	Arufe Martínez, María Isabel

Como participante en el proyecto ha llevado a cabo las siguientes actividades:

- En la asignatura Laboratorio Integrado de Bioquímica y Toxicología (Lic. Química, cod. 206016), ha participado en la puesta en práctica de actividades académicamente dirigidas bajo las siguientes modalidades: realización por parte del alumnado de cuestionarios on-line; elaboración por parte del alumnado de la asignatura de bases de datos de posibles preguntas de examen; y presentación oral de la práctica/as realizadas en la asignatura.
- Elaboración de los resultados observados en las distintas actividades académicamente dirigidas puestas en práctica.

Apellidos y nombre:	Albendín García, María Gemma

Como participante en el proyecto ha llevado a cabo las siguientes actividades:

- En la asignatura Laboratorio Integrado de Bioquímica y Toxicología (Lic. Química, cod. 206016), ha participado en la puesta en práctica de actividades académicamente dirigidas bajo las siguientes modalidades: realización por parte del alumnado de cuestionarios on-line; elaboración por parte del alumnado de la asignatura de bases de datos de posibles preguntas de examen; y presentación oral de la práctica/as realizadas en la asignatura.
- Elaboración de los resultados observados en las distintas actividades académicamente dirigidas puestas en práctica.

Apellidos y nombre:	Moreno Brea, Manuela de Jesús

Como participante en el proyecto ha llevado a cabo las siguientes actividades:

- En la asignatura Laboratorio Integrado de Bioquímica y Toxicología (Lic. Química, cod. 206016), ha participado en la puesta en práctica de actividades académicamente dirigidas bajo las siguientes modalidades: realización por parte del alumnado de cuestionarios on-line; elaboración por parte del alumnado de la asignatura de bases de datos de posibles preguntas de examen; y presentación oral de la práctica/as realizadas en la asignatura.
- Elaboración de los resultados observados en la actividad académicamente dirigida puesta en práctica.

Apellidos y nombre:	Granado Castro, María Dolores

Como participante en el proyecto ha llevado a cabo las siguientes actividades:

- En la asignatura Química Enológica (Lic. Enología, cod. 204005), ha llevado a cabo la puesta en práctica de actividades académicamente dirigidas bajo las siguientes modalidades: presentación oral por parte del alumnado de la práctica/as realizadas en la asignatura.
- Elaboración de los resultados observados en la actividad académicamente dirigida puesta en práctica.

Apellidos y nombre:	Pérez García, Montserrat

Como participante en el proyecto ha llevado a cabo las siguientes actividades:

- En la asignatura Contaminación atmosférica (Lic. Ciencias Ambientales, cod. 2303027) ha llevado a cabo la puesta en práctica de actividades académicamente dirigidas bajo las siguientes modalidades: presentación de un tema; y análisis de casos prácticos.
- Elaboración de los resultados observados en las actividades académicamente dirigidas puesta en práctica.

Apellidos y nombre:	López López, José Antonio

Como participante en el proyecto ha llevado a cabo las siguientes actividades:

- En la asignatura Química Analítica del Medioambiente (Lic. Ciencias Ambientales, cod. 2303027) ha llevado a cabo la puesta en práctica de la actividad académicamente dirigida presentación oral de la/s práctica/s desarrolladas por los alumnos.
- Elaboración de los resultados observados en la actividad académicamente dirigida puesta en práctica.
- Elaboración de abstract, póster y publicación correspondiente al congreso ICERI2012, celebrado en Madrid en noviembre de 2012.

Apellidos y nombre:	Mosquera Díaz, María Jesús

Como participante en el proyecto ha llevado a cabo las siguientes actividades:

- En las asignaturas Química-física macromolecular (Lic. Química, cod. 206050) ha llevado a cabo la puesta en práctica de las actividades académicamente dirigidas, bajo las modalidades de: cuestionarios on-line mediante el uso del campus virtual; presentación de una tema, y elaboración de un glosario de términos.
- Elaboración de los resultados observados en la actividad académicamente dirigida puesta en práctica.

Apellidos y nombre:	Fernández Barbero, Gerardo

Como participante en el proyecto ha llevado a cabo las siguientes actividades:

- En la asignatura Control de Calidad en los Laboratorios Químicos Industriales (Ingeniero Técnico Industrial, cod. 610033) ha llevado a cabo la puesta en práctica de las actividades académicamente dirigidas: elaboración de bases de datos de preguntas de examen; y presentación oral de un tema desarrollado por los alumnos.
- Elaboración de los resultados observados en la actividad académicamente dirigida puesta en práctica.

Apellidos y nombre:	Durán Guerrero, Enrique

Como participante en el proyecto ha llevado a cabo las siguientes actividades:

- En la asignatura Química Aplicada al transporte marítimo (Dip. Navegación Marítima, cod. 1407026) ha llevado a cabo la puesta en práctica de la actividad académicamente dirigida denominada "uso de guiones en clase".
- Elaboración de los resultados observados en la actividad académicamente dirigida puesta en práctica.
- Participación en la elaboración de abstract, póster y publicación correspondiente al congreso ICERI2012, celebrado en Madrid en noviembre de 2012.

Apellidos y nombre:	Fernández Puga, María del Carmen

Como participante en el proyecto ha llevado a cabo las siguientes actividades:

- En las asignaturas Exploración y Explotación de Recursos en Cuencas Sedimentarias Marinas (Lic. Ciencias del Mar, cod. 2302047) y Riesgos Naturales (Grado de CC Ambientales, cod. 42306023) ha llevado a cabo la puesta en práctica de las actividades académicamente dirigida denominadas "elaboración y presentación de un tema relacionado con la temática de la asignatura".
- Elaboración de los resultados observados en la actividad académicamente dirigida puesta en práctica.

Apellidos y nombre:	Castro Mejías, Remedios

Como participante en el proyecto ha llevado a cabo las siguientes actividades:

- En la asignatura Química enológica (Lic. Enología, cod. 204005), de la que es responsable, ha llevado a cabo la puesta en práctica de actividades académicamente dirigidas bajo la siguientes modalidades: realización por parte del alumnado de cuestionarios on-line; elaboración por parte del alumnado de la asignatura de bases de datos de posibles preguntas de examen; presentación de un tema o de parte de un tema ó de un artículo científico relativo a la asignatura; Presentación oral de la práctica/as realizadas en la asignatura.
- Elaboración de los resultados observados en las distintas actividades académicamente dirigidas puestas en práctica.
- Participación en la elaboración de abstract, póster y publicación correspondiente al congreso ICERI2012, celebrado en Madrid en noviembre de 2012.

Apellidos y nombre:	Astola González, Antonio

Como participante en el proyecto ha llevado a cabo las siguientes actividades:

- En las asignaturas Metabolismo y su regulación (Grado Biotecnología, cod. 40211010) y Laboratorio Integrado de Bioquímica y Toxicología (Lic. Química, Cod. 206016) ha llevado a cabo la puesta en práctica de las actividades académicamente dirigida denominadas "elaboración de bases de datos de preguntas tipo test para examen" y "presentación oral de la/s práctica/s realizadas en la asignatura.
- Elaboración de los resultados observados en la actividad académicamente dirigida puesta en práctica.
- Participación en la elaboración de abstract, póster y publicación correspondiente al congreso ICERI2012, celebrado en Madrid en noviembre de 2012.
- Asistencia al congreso ICERI2012, celebrado en Madrid en noviembre de 2012.

2. Aporte el producto final generado para la difusión.

- Artículo y Poster presentados al Congreso ICERI 2012

IMPLEMENTATION AND ANALYSIS OF NEW LEARNING ACTIVITIES IN THE CONTEXT OF DIFFERENT DEGREES: RELATIONSHIP BETWEEN BOTH FACTORS

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Abstract

The assessment of the competencies in the new European higher education system supposes a big challenge to the European Universities in general and to the University of Cadiz in particular, owing, on the one hand, by the lack of resources to carry out this difficult task and, on the other hand, by the high number of students in the lecture room. The members of the group that present this paper are participating in an Innovative Project entitled "Implementation and analysis of new learning activities in the context of different grades: relationship between both factors".

The team is constituted by fourteen professors who teach in different Grades in the University of Cadiz. This group has developed and carried out different learning activities in different Grades such as Marine Sciences, Environmental Sciences, Chemistry, Enology, Biotechnology, etc. Students of these grades were characterized by different ages, maturity grades, with and without work, etc. Besides, the characteristics of the subjects in which the activities were applied were taken into account.

In order to compare the suitability of the proposed activity for each group of students, the same activity was implemented in different subjects from different grades. Some of the activities studied were: resolution of on-line tests constructed by professor; construction of tests by students and, later, used as exams by professor; oral presentations of research articles and/or practical sessions; use of outlines by students during theoretical sessions; study of practical situations; etc.

The aim of this work was the evaluation of the proposed activities to select those ones, which revealed to be more appropriate for each type of student according to their own characteristics (age, maturity grade, only study or study and work simultaneously, etc.) and the type of subject in the framework of their degree. In the meanwhile, the group of professors involved in this project has developed activities for continuous evaluation of students as well as to enhance them to be more active in the classroom during the lecture and out the classroom by themselves.

In all cases, students have demonstrated a high level of participation in all proposed learning activities. However, some activities have showed to be more appropriated for advanced students, who showed higher self-confidence and higher maturity grade; and only a weak influence of the type of subject or degree has been appreciated.

Keywords: Higher Education, Learning activities, Different degrees Innovation,

1 INTRODUCTION

The European Higher Education Area (EHEA) presents an important change in which the learning model has evolved from a system based on the professor as the only source of knowledge toward another one focused on the autonomous work of the student. In this new model, the one direction communication from professor to students during the lecture has been replaced by an active role of students and a higher responsibility in their learning process [1, 2].

In this context, the educational achievements included in a subject, course or degree, deal with the acquisition not only of knowledge, but also of skills, abilities and techniques that students will have to use later in the exercise of their professional activities. All of this requires important changes in the teaching process followed by professor toward the use and the development of new learning methodologies in which students may play an active role.

The members of the group presenting this paper are participating in an innovative project entitled "Implementation and analysis of new learning activities in the context of different grades: relationship between both factors". This team is constituted by fourteen professors who teach in different degrees at the University of Cadiz, such as: Marine Sciences, Environmental Sciences, Chemistry, Enology, Biotechnology, etc. All professors belong to the branch of knowledge of Science in the University of Cadiz (UCA), and have participated in different innovation projects during the last years to get for an appropriate adaptation at the European Higher Education Area (EHEA). Alongside its time of activity, this group has applied active methodologies: practice cases, collaborative work, tutorials, multimedia technologies, and therefore its students have been involved in their learning process [3, 4, 5].

In our opinion, different aspects related to students and subjects should be taken into account when a new learning strategy is employed. Among these aspects, age, maturity grade, possible study and work simultaneously, etc. should be considered. In the case of subjects, aspects such as its possible compulsory or optional character should be taken into account.

So, the objective of this work was the evaluation of certain learning activities to select those ones, which revealed to be more appropriate for each type of student according to their own characteristics (age, maturity grade, only study or study and work simultaneously, etc.) and the type of subject in the framework of their degree.

The learning activities were selected taking into account the teaching experience of the members of the working group. Some of the activities studied were: resolution of on-line tests constructed by professor; construction of tests by students and, later, used by professor as a part of the final exams; oral presentations of research articles and/or practical sessions; use of outlines by students during theoretical sessions; study of practical situations; etc. Most of them were used in different subjects in order to study the possible interrelationship between student typology and subject and to establish the suitability of the proposed activity for each group of students.

2 METHODOLOGY

One of the most important consequences of the Bologna process in the European Universities has been the revision of the traditional methodologies of teaching in Higher Education. Taking into account the requirements of the Bologna process in the European Higher Education Area, European Universities have had to revise their traditional teaching methodologies in order to adapt to the current educational framework, which requires a higher participation of students.

With this mind, different learning activities have been selected taking into account the previous experience of the working group. They were chosen during several meetings in which different aspects of different learning activities were discussed. So, as it was mentioned previously, the selected learning activities were: resolution of on-line tests; construction of tests by students; oral presentations of research articles and/or practical sessions; use of outlines; and study of practical situations.

All of them were evaluated at least in two subjects with different characteristics (different grades, different courses, optional or compulsory, etc.), to compare how suitable they are for students from different degrees and/or courses Learning activities and subjects in which they were applied are shown in table 1.

Table 1. Learning activities and subjects selected.

Subject	On-line tests	Construction of tests	Oral presentations of research articles	Oral presentations of practical sessions	Study of practical situations	Use of outlines
Enological Chemistry	X		X	X		X
Integrated Laboratory of Toxicology and	X	X		X		

Biochemistry								
Atmospheric Pollution	X			X			X	
Macromolecular Chemistry-Physics	X			X				
Chemistry Applied to Maritime Transport								X
Metabolism and Regulation		X						
Exploration and Exploitation of Energy Resources in Marine Sedimentary Basins				X				
Natural Risks				X				
Environmental Analytical Chemistry				X		X		
Quality Control in Analytical Laboratories		X		X			X	

Following a brief description of the characteristics of the selected subjects in terms of organization and number of students is provided.

Enological Chemistry. This is a 9 ECTS compulsory subject taught in the third course of the Degree in Enology. Approximately 30 students were enrolled in the subject. Most of them are students who study and work simultaneously

Integrated Laboratory of Toxicology and Biochemistry. This subject is taught in the fifth course of the Degree in Chemistry. It is a compulsory subject with 9 ECTS and the 38 students were enrolled in it.

Atmospheric Pollution. It is a compulsory subject taught in the fifth course of the double Degree in Marine and Environmental Sciences with 6 ECTS. In this case, a high number of students participated in the learning activities selected.

Macromolecular chemistry-physics. It is an optional subject of the last courses of the Degree in Chemistry. 20 students were enrolled in it. This subject combines both the presence training and the methodologies based on new technologies.

Chemistry applied to maritime transport. It is an optional subject with 4.5 ECTS of the degree in Nautical Engineering and Maritime Transportation. Only 7 students of a total of 23 have participated in the activities proposed. Most of students enrolled in this subject are studying and working simultaneously.

Metabolism and regulation. It is a compulsory subject in the first course of the Degree in Biotechnology. 51 students were enrolled in this subject. 48 students participated in the activities selected. Studying is the only occupation of the main part of these students.

Exploration and exploitation of energy resources in marine sedimentary basins. It is an optional subject with 6 ECTS. The learning activities were followed by a low number of students in a voluntary way.

Natural risks. It is a compulsory subject taught in the third course of the Degree in Environmental Sciences with 6 ECTS. The learning activities carried out in this subject were compulsory.

Environmental Analytical Chemistry. It is an optional subject of the fifth course in the Degree of Chemistry with 6 ECTS. From the 24 students enrolled in it, 22 have participated in the learning activities proposed.

Quality control in analytical laboratories. It is an optional subject in the last course of the Degree in Industrial Technology Engineering whose students are working and studying simultaneously.

After the selection of the learning activities and subjects in which they were carried out, several meetings of the working group took place. In these ones, professors showed their results about the learning activities performed, trying to study the suitability of the proposed activity for each group of students.

3 RESULTS

3.1 On-line tests

On-line tests were elaborated by professors from different subjects and presented to students via the Virtual Campus. Thus, students had to answer them. Students´ answers were automatically corrected by the informatics application of the Virtual Campus and as a consequence, students could know their marks at the moment they finished the test. Furthermore, the Virtual Campus offered the correct answers to help students to identify their errors.

This learning activity was carried out in four subjects with different characteristics (optional and compulsory; different degrees, etc.). In all cases, the results obtained were very satisfactory, and a high degree of participation was obtained. Most of students who participated in this activity obtained good marks.

In table 2, the marks obtained for participants in this activity for the subject “Enological Chemistry” are showed. As can be seen, all students obtained marks higher than 5. In this case, the 90.5% of students who attended this subject regularly participated in this activity.

Table 2. Marks obtained for students of the subject “Enological Chemistry” in the activity “on line tests”.

Number of students	Mark
1 student	5-6
6 students	6-7
1 student	7-8
1 student	9-10

3.2 Construction of tests by students

This learning activity was applied to three subjects, one of the first course of the Degree in Biotechnology and two others belonging to the latest courses of two different degrees.

In the first case, students belong to the first course of Biotechnology, a high percentage of participation and marks were reached (Fig. 1). They were significantly upper than those correspond to higher courses of other degrees. It could be explained taking into account that all these students entered at university with very high marks from the intermediate education, so, in principle, they were supposed to be excellent students.

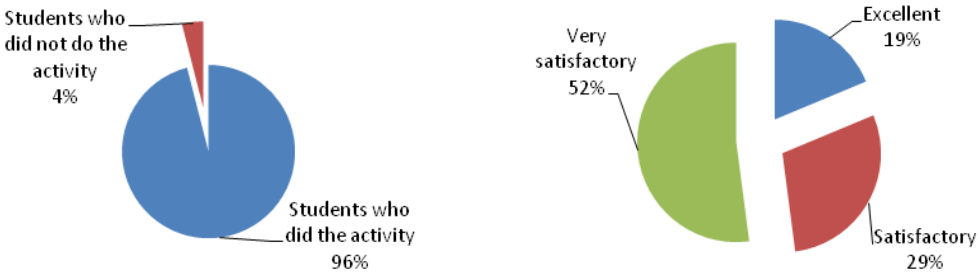

Fig. 1. Percentage of participation and marks for the activity "construction of tests". Students of the first course of Biotechnology.

Nevertheless, in general, a lower percentage of participation was obtained for this activity in comparison with the previous one. A reason for this decrease could be that students need more time and effort to complete the activity if it is compared with answering a test.

In table 3, results obtained for this learning activity in "Integrated Laboratory of Toxicology and Biochemistry" are shown. This subject is characterized by a higher level of maturity of students, who are in the last course of the Degree in Chemistry. This is appreciate in the high percentage of participation in this activity; a 81.25% of students who regularly attended to lectures. As can be seen, most of students obtained the highest mark for this activity.

Table 3. Results obtained for students of the subject "Toxicology and biochemistry integrated laboratory" in the activity "construction of tests".

Number of students	Mark
3 students	0.10
2 students	0.15
4 students	0.20
17 students	0.25 (maximum)

In relation to the characteristics of the tests, a higher quality of the questions was observed as the courses in the degrees increased. The questions written by students from the latest courses were grammatically better elaborated. In the case of students from the first courses, the quality of the questions was lower and in some occasions, they were incorrectly written from a grammatical point of view.

When students were asked to give their opinion about this type of learning activity, in general, they were very positive but they mentioned that the weight of the marks assigned by professors was a very small proportion of the final assessment, taking into account the effort necessary to perform the activity.

3.3 Oral presentations of research articles and practical sessions

In most of the subjects considered in this study, oral presentations of research articles and/or practical sessions by students were carried out.

In relation to this activity, on the one hand, a significant difference was observed between the oral presentation of a research article and a practical session carried out previously in the lab by students.

In the second case, students, who presented their practical results showed to have a higher self confidence and the sessions were more attractive because, in their opinion, they had to show and defend their own results.

On the other hand, even in the highest courses, most of students showed a lower scientific level than expected and a lack of self-confidence during their presentations.

When students were asked about this activity, their opinions were focused on the inconvenient of speaking in public meant. Another aspect, which was badly evaluated by students, was the low recognition that this type of learning activity had by professors, i.e. a high effort by students had been done and the reward was very low.

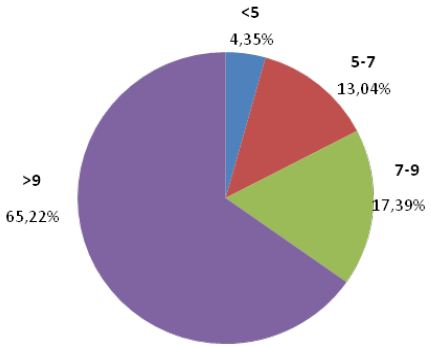

Fig. 2. Marks obtained by students from the subject “Environmental analytical chemistry”. Activity: “oral presentations of practical sessions”.

In particular, oral presentation of practical works was implemented in the subject “Environmental Analytical Chemistry”, where 21 of 22 students participated in this activity and obtained a mark higher or equal than 5, as can be seen in figure 2, being the average mark obtained by these students was 8.4.

3.4 Study of practical situations

This learning activity has been performed in two subjects, one from the double Degree in Marine and Environmental Sciences and the other one from the Degree in Industrial Technology Engineering. The first one is compulsory whereas the second one is optional. Both of them are subjects which belong to the last course, but in the first case, most of students only study whereas in the second case, students work and study simultaneously. In both cases, this learning activity was compulsory so a high participation percentage was obtained for both subjects.

When students were asked about this activity, they made known their discontent with the weight of the marks assigned by professors to this activity in the total of the subject. In their opinion, it was too low (10% and 30% in each subject respectively) taking into account the effort necessary to perform the activity.

In spite of the higher maturity grade of students who participated in this activity, the quality of the works was, in most of the cases, low. It could be explained taking into account both the required effort to do the activity and the low weight of the activity in the subject.

3.5 Use of outlines

This tool was employed in two subjects: Enological Chemistry and Chemistry Applied to Maritime transport. In both cases, a low number of students in respect of the total one enrolled for these subjects attended them regularly. Apart from it, both groups of students are working as well as studying.

In both subjects, different outlines, with some spaces in blanks, were given to students during different theoretical lessons. In each occasion, students had to fill in the blanks during the lesson. An example of the outlines employed is shown in Fig. 3.

This activity was very well evaluated for all students. They said that the use of outlines helped them with the lessons, reaching a higher concentration level.

This good evaluation could be explained on the basis of the low effort that this activity represented for students too.

4 CONCLUSIONS

Different learning activities have been evaluated in order to study their suitability according to student characteristics (age, maturity grade, only study or study and work simultaneously, etc.) and type of subject in the framework of different degrees.

In all cases, students have demonstrated a high level of participation in all proposed learning activities, even in the case of optional activities and/or optional subjects. Some activities have showed to be more appropriated for advanced students, who showed higher self-confidence and higher maturity grade. These ones were: oral presentations of research articles and/or practical situations, and the construction of tests.

In relation to type of subject or degree, only in some cases, a weak influence of the type of subject or degree has been appreciated.

Acknowledgments

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Name and Surname:

1.- The origin of petroleum and natural gas, derived from the decomposition of remains of plants and animals on seas and oceans for thousands of years, is proposed by the theory of origin _____.

2.- Open chain saturated hydrocarbons are designed_____.

3.- An example of aromatic hydrocarbon is _____.

4.- Petroleum of naphthenic base presents a minimum of _____ % of naphthenes.

5.- To modify, generally to increase, the proportions of volatile fractions of petroleum is called _____.

6.- The refine is the process employed to eliminate from petroleum fractions the undesirable compounds such as _____.

7.- The transformation of paraffins into cycloparaffins in the catalytic cracking is called _____.

8.- From the refinery products, those presenting a boiling point of 35 ºC – 195 ºC are called _____.

9.- From the refinery products, those with a C_{14} – C_{20} structure are called _____.

10.- The refinery products employed as raw material for the production of soaps are the _____.

Fig. 3. Example of the outlines employed in the subject “Chemistry Applied to Maritime Transport”.

Poster

IMPLEMENTATION AND ANALYSIS OF NEW LEARNING ACTIVITIES IN THE CONTEXT OF DIFFERENT DEGREES: RELATIONSHIP BETWEEN BOTH FACTORS

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Introducction

The European Higher Education Area (EHEA) presents an important change in which the learning model has evolved from a system based on the professor as the only source of knowledge toward another one focused on the autonomous work of the student. In this new model, the one direction communication from professor to students during the lecture has been replaced by an active role of students and a higher responsibility in their learning process [1, 2].

In this context, important changes, in the teaching process followed by professor toward the use and the development of new learning methodologies in which students may play an active role, are required.

In this sense, different aspects related to students and subjects should be taken into account when a new learning strategy is employed. In our opinion, aspects such as age, maturity grade, possible study and work simultaneously together with the possible compulsory or optional character of the subject should be taken into account.

Objectives

The goal of this project was the evaluation of certain learning activities to select those ones, which revealed to be more appropriate for each type of student according to their own characteristics (age, maturity grade, only study or study and work simultaneously, etc.) and the type of subject in the framework of their degree.

Methodology

Different learning activities have been selected taking into account the previous experience of the working group [3-5]. These ones were: resolution of on-line tests; construction of tests by students; oral presentations of research articles and/or practical sessions; use of outlines; and study of practical situations. All of them were evaluated at least in two subjects with different characteristics (different grades, different courses, optional or compulsory, etc.), to compare how suitable they are for students from different degrees and/or courses. Learning activities and subjects in which they were applied are shown in table 1.

Subject	On-line tests	Construction of tests	Oral presentations of research articles	Oral presentations of practical sessions	Study of practical situations	Use of outlines
Enological Chemistry	X		X	X		X
Integrated Laboratory of Toxicology and Biochemistry	X	X		X		
Atmospheric Pollution	X		X		X	
Macromolecular Chemistry-Physics	X		X			
Chemistry Applied to Maritime Transport						X
Metabolism and Regulation		X				
Exploration and Exploitation of Energy Resources in Marine Sedimentary Basins			X			
Natural Risks			X			
Environmental Analytical Chemistry			X	X		
Quality Control in Analytical Laboratories		X	X		X	

Table 1. Learning activities and subjects selected

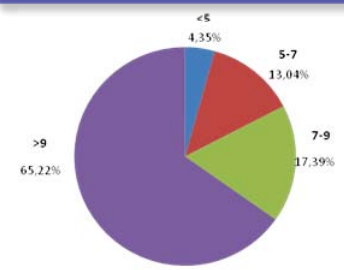

Figure 2. Optional Subject "Environmental Analytical Chemistry". Students of the last course of Chemistry. Marks for the activity "oral presentations of practical sessions".

Results

Figure 1. Percentage of participation and marks for the activity "construction of tests". Students of the first course of Biotechnology.

Number of students	Mark
3 students	0.10
2 students	0.15
4 students	0.20
17 students	0.25 (maximum)

Table 2. Subject "Integrated Laboratory of Toxicology and Biochemistry" . Students of the last course of Chemistry. Marks for the activity "construction of tests".

Conclusions

Different learning activities have been evaluated in order to study their suitability according to student characteristics (age, maturity grade, only study or study and work simultaneously, etc.) and type of subject in the framework of different degrees.

In all cases, students have demonstrated a high level of participation in all proposed learning activities, even in the case of optional activities and/or optional subjects. Some activities have showed to be more appropriated for advanced students, who showed higher self-confidence and higher maturity grade. These ones were: oral presentations of research articles and/or practical situations, and the construction of tests.

In relation to type of subject or degree, only in some cases, a weak influence of the type of subject or degree has been appreciated.

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