

EVALUATION AND ACTIVITY GROUP ON THE SUBJECT ORGANIC CHEMISTRY DEGREE IN SCIENCE AND FOOD TECHNOLOGY

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Abstract

The area of Organic Chemistry of the UBU (University of Burgos) has been working for several years on a series of new initiatives at the teaching level aimed to improve the results in this discipline and, especially in the learning of stereoisomerism and stereochemistry in the first courses of the Chemistry Degree. Our concern for continuous improvement leads us to look for new methodologies, paying special attention to the choice of activities, but also taking care about mechanisms for their evaluation. In this paper, we develop an activity oriented to be done by groups of students to learn stereoisomerism of organic compounds. We also present the way to evaluate this activity, which is a part of the practices corresponding to organic chemistry subject for the first year of the Degree on Science and Food Technology. The group activity is the development of a poster. The central topic of each poster is the characterization-study of stereoisomerism and the uses in everyday life of an organic molecule. An aspect of this activity that needs to be underlined is the ongoing evaluation, with the follow-up of: 1) Acquisition of knowledge, 2) Development of skills, and 3) Student satisfaction. This assessment allows us to get a more objective grading and, at the same time, adjustments for its improvement. In the final exhibition of the posters, all groups and teachers of the subject take part in the task of qualifying the result of each group. For qualifying, it has previously been provided a rubric.

The main achievement observed after some years implementing this learning methodology is the increase of the number of students who pass the subject of Organic Chemistry. Furthermore, this activity is positively evaluated by the students.

Keywords: Organic chemistry, stereoisomerism, a group activity, continued assessment.

1 INTRODUCTION

In the current design of university Degrees, based on the credit system, the student is the center of learning process versus traditional education based on teacher education. For this purpose, it is necessary to fix a workload that ensures the objectives of learning, which in turn must be grounded in acquiring skills and learning outcomes. The student must have an active and participatory role and the teacher responsible for the process will be involved with quality and continuous improvement, leading to changes in the teaching-learning methodologies and evaluation modalities.

To design the methodology of teaching and learning in a subject it is necessary to take into account several aspects. One of them is if the contents given in the subject matter are specific of the degree, and therefore, novel for students, or is a basic or generic material that has already been issued by the student before joining the University. We must also take into account the course that is taught within a degree, since there are many differences between students in the first year and the last one. In addition, another important aspect is the type of subject as to whether it is theoretical or practical, since the load and type of work will be different [1].

Special attention should be paid in the choice of the activities proposed to the student, to make them attractive, stimulate their curiosity, keep him motivated, and at the same time be useful to develop the competences required for the subject. In this regard, the activities in groups, cooperative or collaborative are effective for obtaining certain competencies, although the difficulty is to put them into practice. Besides, such activities have to be evaluated according to clear criteria previously established.

Evaluation is one of the key elements of the teaching-learning process and also the most problematic aspect of the learning process, both for students and teachers. Realization of the consequences of assessment has led to a new approach toward evaluation; to understand it as formative evaluation which should contribute to skills development. This means:

- consistency between training objectives and evaluation, and
- use for continuous improvement.

In the field of competence assessment it is important that all results are evaluated (knowledge, skills and attitudes) through various procedures and in some cases from the active performance of students in solving real problems that allow them to use their knowledge in a creative way.

The competence assessment also involves the participation of the student in the evaluation. There are a series of elements that favor, enhance or assume such participation: the feedback during the process, the possibility of improving, self-evaluation and peer evaluation, as well as reflection [2].

The area of Organic Chemistry of the UBU (University of Burgos) has been working for several years on a series of new initiatives at the teaching level aimed to improve the results in this discipline and, especially in the learning of stereoisomerism and stereochemistry in the first courses of the Chemistry Degree. We put special attention to the choice of activities, so that they are attractive to the student, stimulate their curiosity and keep them motivated for the study of the matter, applying formative assessment procedures.

This paper presents a group activity, as well as their form of assessment, carried out by students of the Degree of Science and Food Technology of the University of Burgos.

2 OBJECTIVES

The objectives we proposed to get were:

- Facilitate the stereochemistry learning to the students of the first year of the Degree in Science and Food Technology through an innovative and motivating activity.
- Improving the learning outcomes of organic chemistry in these students.
- To promote the development of cross skill, ability to work in Group

3 DESCRIPTION OF THE ACTIVITY

In this section we are going to define the activity.

3.1 Context

The group activity is one of the activities to be performed by students in the practices of the subject Organic Chemistry first year of the Degree of Science and Food Technology.

Organic Chemistry practices developed over five weeks in the first semester, accounting for 20% of the total grade of the subject and are focused on the study of stereoisomerism of organic compounds. Stereoisomerism has been chosen by the difficulty of learning and its relevance to other disciplines taught later in the degree. Evaluating practices is configured as detailed in Table 1:

Table 1. Evaluation of practices in Organic Chemistry

Activities / procedures	Weight rating
Attendance and participation	5 %
Remote problem solving	10 %
Assessment test at the end of each session	10 %
Group activity	30 %
Written final test	45%

The face to face of these practices is divided into five sessions of three hours and at the rate of one session per week. In the face to face sessions they are exposed and explained the basic concepts, at the same time the student works on solving exercises, using molecular models. Thus, acquired knowledge, skills and ability are developed to implement these resources in different situations, such as those to be found in the various evaluation activities.

The face-to-face practices are carried out in groups of less than 20 students and at least two teachers are involved.

In non-face-to-face sessions students have to perform various tasks, among which the group activity is included.

3.2 What is the group activity about?

The work group is developing a poster. Each poster must show characterization, stereoisomeric study and uses in everyday life of a chiral organic molecule, chosen for its pharmacological interest, or because of their relationship with science and food technology. Teacher assigns to each group one of these molecules and the group has to carry out the work relying on the contents developed along the practices of Organic Chemistry. At the end of the practice, all posters are publicly exposed at the Faculty of Sciences.

3.3 Methodology

This activity is carried out in seven steps or stages, this means seven tasks which in turn generate same other deliveries. All deliveries must be accompanied by an activity report. The latest delivery corresponds to the final poster. Fig. 1 shows the structure having the Group Activity (AG) in Moodle platform.

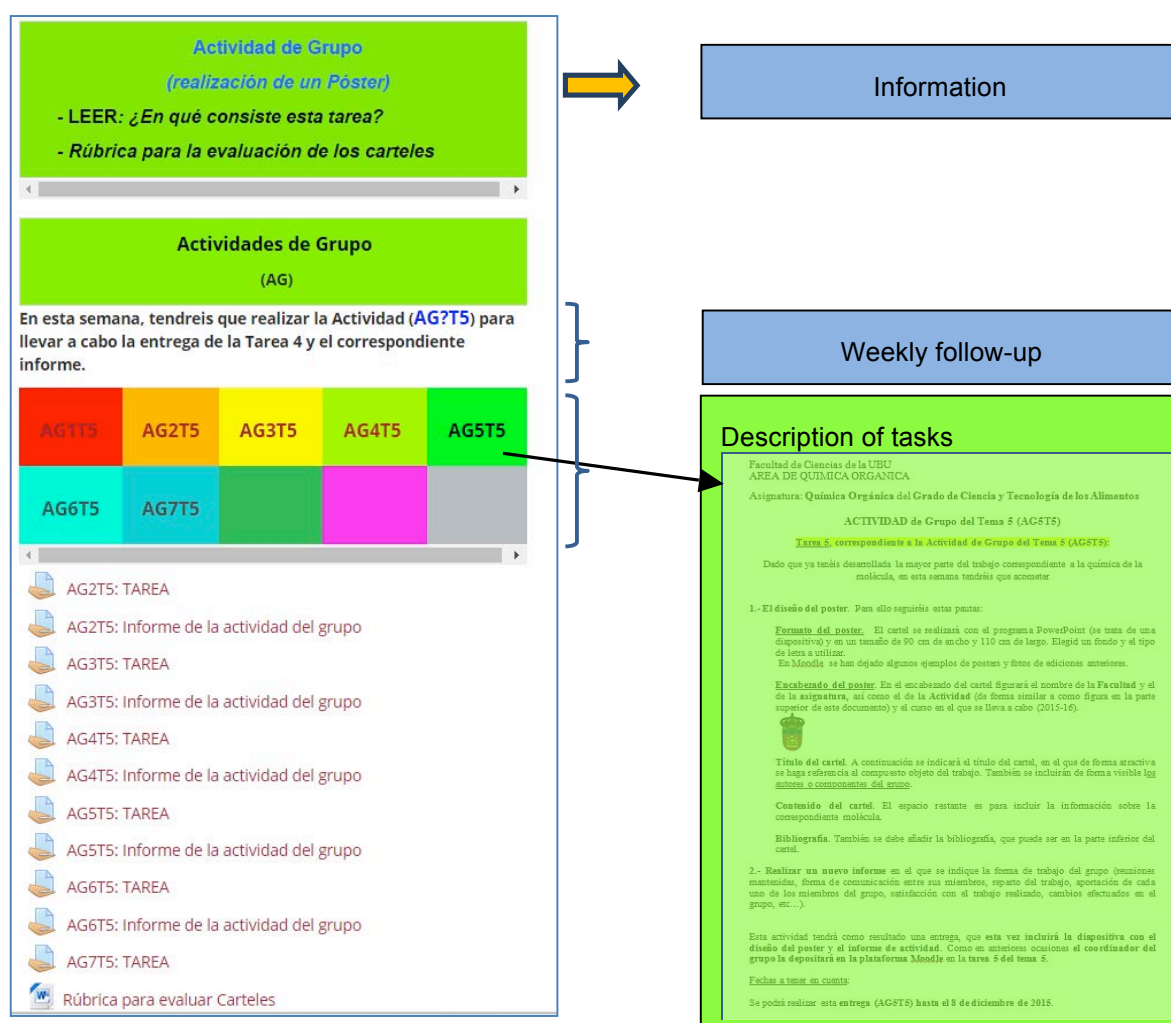


Figure 1. Structure of Group Activity in Moodle

The first step is to form the groups at the beginning, where there can be three, four or five students. In each group there is a coordinator who will be the interlocutor with the teacher and the head of deliveries.

Weekly, after each session of practical classes, the groups are assigned a task related to the stereochemistry of the molecule, and it shall be delivered by attaching a small report that indicates the achievements and way of working of the group (meetings held, form of communication among its members, satisfaction with the work done and the noteworthy incidents). Weekly tasks are proposed at the end of the face-to-face sessions, where the student, as well as knowledge, he has acquired skills needed for their implementation.

The last task corresponds to the assessment made by the students of all the posters.

4 EVALUATION

The following evaluation methods were used.

No qualification is associated with the formation of groups and appointment of the coordinator (first stage). The teacher collaborates with students on the formation of groups and assigned the organic compound object of work.

In the four following stages (two to five), all deliveries are checked by the teacher and returned to coordinator with corrections and comments in order to reach an optimal resolution of the tasks. This process provides a feedback between students and teacher. The teacher qualifies with a note each of these tasks.

After the tasks are corrected with the information to be included in the poster, in the next step the printed poster is deposited.

About activity reports, they are the result of reflection of the students, and serve to detect problems and assess the attitude of the members of the group. Through this process of self-evaluation and peer evaluation we know if any student has not participated in the group activity. Such students are away from the assessment process.

The activity ends with the exhibition of posters (Fig. 2) and the assessment by groups (Task seven) and teachers involved (peer and co-evaluation). For the qualification of the poster it is available a rubric.



Figure 2. Exhibition of posters for evaluation

The rubric includes a set of criteria with four levels of assessment, excellent, notable, sufficient and poor. The criteria underlying the qualification are: 1) the poster elements; (2) content; 3) format, and 4) presentation of set.

The final note of the activity takes into account all qualifications obtained throughout the process.

5 RESULTS

The activity report delivered to the rating of the poster includes a commentary on student satisfaction with the group activity. Examples of the opinions given by the students are.

- ✓ The result has been very successful thanks to the excellent communication, tolerance and of course, learning attitude, help and work.
- ✓ We recommend that this activity becomes more years as it is entertaining, interesting and new things are learned.
- ✓ We are very satisfied with the work, although we would have liked the molecule was related to science and food technology, such as a feed additive.

When the semester is finished, students fill in a satisfaction questionnaire about all subjects, and their opinion is collected.

Positive opinions:

- The practice is where we learn most of the subject.
- You learn a lot in practices.
- The practices are fun.
- Dynamic practices.
- Useful practices.
- Good explanations in practices.
- The practices are made enjoyable and useful.

Negative opinions:

- Practices should count more in the final grade of organic chemistry subject.
- Practices for repeaters are not saved.

The results of the evaluation have been used for continuous improvement. With the data obtained each course always adjustments and novelties for next year are introduced.

It has been found that activities in the practices of organic chemistry are suitable for learning stereochemistry, as about 95% passed practices with remarkable average. It has also managed to increase the success rate of organic chemistry course, from 56-57% to 65%.

Teachers, in turn, have compiled the poster generated each course by the group activity and published these materials in the repository of the university [3]. This result is recognized as merit in teacher evaluation.

6 CONCLUSIONS

After five years of implementation of the above group activity, with students of the first year of the Degree of Science and Food Technology, we have reached the following conclusions:

- This type of activity is appropriate to improve the learning of stereochemistry.
- It encourages students to study organic chemistry subject. This subject has dramatically decreased abandonment.
- This activity allows assessment of competence development.

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