Abstract

In the Spanish educational system, students can access university through several routes, but they most frequently do so after the completion of the baccalaureate and the entrance exam to the university. From those two, a mark is inferred that must be higher than the cut-off mark of the chosen grade so as to join it. The subject Chemistry corresponds to the baccalaureate modality "Science and Technology" and it is taught during its second and last year.

In this work we tried to assess why the Chemistry grade students chose the degree, the impact that the teaching-learning of the Chemistry subject has had during the baccalaureate, and finally the adequacy of the Chemistry content of the 2nd baccalaureate school year as the basis for the studies at the university. With such aim, a questionnaire was designed and distributed among 86 first year Chemistry degree students at the Faculty of Science and Technology of the University of the Basque Country, in the campus of Biscay, during the last scholastic days of the 2016-2017 academic year.

More than the half of the surveyed (56%) stated their first career option had been the Chemistry degree. The following grades chosen as the first option were Biology (14%), Biochemistry (10%), Pharmacy (5%), Chemical Engineering (4%), etc. Except for the Pharmacy degree, which is not taught at the campus of Biscay, the cut-off mark was higher than that of the Chemistry degree in the school year 2017-2018, 8.9.

Regarding the subject in High School, the surveyed students mostly (52%) depicted the subject Chemistry as attractive in 4 points out of 5 and the 67% of them considered having had a teacher as good as 4 or 5 points out of 5. It is also remarkable that, concerning the experimental practice and despite its importance, as stated at the program of the Basque autonomous community, the 37% of the students reported they had not done laboratory work at all and only the 27% had practiced at the lab. The remaining 36%, had either seen a demonstration in the laboratory, watched a video and/or had seen the script.

Concerning the difficulty of the chemistry contents in its different sections in the 1st year of the degree as compared to High School, most of the students (74%) answered they observed a continuity in the Inorganic Chemistry contents and approximately half of them answered Organic Chemistry was more difficult in the degree. The percentage of the questioned students who declared the contents were more difficult at the Chemistry degree increased up to 85% or more when questioned about Analytical Chemistry and Physical Chemistry.

Keywords: baccalaureate, career options.

1 INTRODUCTION

In the Spanish educational system, students can access university through several routes, but they most frequently do so after the completion of the baccalaureate and the entrance exam to the university (UAT). From those two, a mark is inferred that must be higher than the cut-off mark of the chosen grade so as to join it. The subject Chemistry corresponds to the baccalaureate modality "Science and Technology" and it is taught during its second and last year.

The baccalaureate is aimed to train the student and to provide them with intellectual and human maturity, knowledge and skills that enable them to progress personally and socially to join the active life or/and higher education [1].

The Baccalaureate is organized in different modalities, with common subjects, subjects of modality and optional subjects that are oriented to the attainment of the objectives, common to all the modalities. The modalities are organized in relation to the great spheres of knowledge and to the teachings that constitute higher education, both university and non-university, which can be pursued after high school [1]. Students must choose one of the following amongst the three Baccalaureate
modalities: 1) Arts, 2) Humanities and Social Sciences, and 3) Science and Technology. The subject "Chemistry" corresponds to this last modality and takes place during the second year. Afterwards, students who want to access the University take the University access written test (UET). The access of the students to the chosen University grades will be determined by the mark obtained at it, along with the average score obtained in the Baccalaureate [2].

The Chemical Sciences degree provides the students with the theoretical and practical knowledge they need to work as a chemist. The course also provides basic knowledge of the different areas of the chemical sciences and other related experimental sciences. In the first year of the degree, students undergo two core subjects: General Chemistry I (GCI) and General Chemistry II (GCII). The contents of the first are related to Inorganic and Organic Chemistry, whilst those of the second relate to Analytical and Physical Chemistry. The academic results of the students have clearly been different for those two subjects since this degree design was implemented. In QGI the percentage of success has been relatively high whilst the opposite has happened in QGII.

Therefore, in this work we tried to assess why the Chemistry grade students chose the degree, the impact that the teaching-learning of the Chemistry subject has had during the baccalaureate, and finally the adequacy of the Chemistry content of the 2nd baccalaureate school year as the basis for the studies at the university.

2 METHODOLOGY

From the point of view of social research, the questions of a questionnaire are the expression, in the interrogative form of the empirical variables, or indicators about which it is interesting to obtain information [3]. Therefore, with the aim described above, a questionnaire was designed and distributed among 86 first year Chemical Sciences students at the Faculty of Science and Technology of the University of the Basque Country, in the campus of Biscay, during the last scholastic days of the 2016-2017 academic year.

At the time of the survey, the students had completed 2 core Chemistry subjects: GQI in the 1st semester, conformed by two different parts, respectively based on Inorganic Chemistry and Organic Chemistry; and in the second semester, the subject General Chemistry II, with contents of Physical Chemistry and Analytical Chemistry.

The students were asked about their Chemistry Baccalaureate teacher’s degree, their degree choice in the application for the University of the Basque Country, their marks in the Chemistry subject at the Baccalaureate and the UET, the didactic tools implemented in the subject, whether they underwent laboratory practice. Also, they were asked to mark (from 0 to 5) they would lay on the following items about the Chemistry subject: appeal of the subject, specification of everyday and environmental examples, the professional quality of the teacher, and the difficulty comparison of the contents of the four branches of Chemistry between the 2nd year of the baccalaureate and the first year of the degree.

3 RESULTS

More than half of the surveyed (56%) stated their first career option had been the Chemical Sciences. The following grades chosen as the first option were Biology (14%), Biochemistry (10%), Pharmacy (5%), Chemical Engineering (4%), etc (Fig.1). The cut-off mark for the other degrees chosen by the students were higher than that of the Chemical Sciences at the University of the Basque Country, in the campus of Biscay, in the school year 2017-2018, 8.9 [4].

Regarding the subject in High School, most of the surveyed students (72%) depicted the subject Chemistry as attractive in 4 or 5 points out of 5 and the 67% of them considered having had a teacher as good as 4 or 5 points out of 5. Most of those teachers, as described by their former pupils, had undertaken the Chemical Sciences (66%) and it was textbooks the most widely spread didactic tools, either in combination with some other didactic tools or on their own.

As described by [5], in Chemistry learning and teaching, it is convenient to highlight motivating aspects for students and teachers, such as: the relationship of chemistry with daily life, the topics related to the protection of environment or those that have connection with the student's vocational interests, and laboratory practices.
The 1st year Chemical Sciences students were certainly asked on the weight the examples related to the everyday life or environment had had in the subject in their 2nd baccalaureate year. In average, the mark the subject had in relation to the weight of everyday life examples was 2.6 over 5 and 2.8 over 5 regarding the environment related examples.

According to the actual regulation in the Basque Country [6], the development of the subject Chemistry should contribute to the familiarization with the scientific and technological activity and to the acquisition of the competencies that such activity entails, particularly in the field of chemistry. In such appropriation, laboratory practices play an important role as part of the scientific activity: the problems posed, their interest, the tentative answers, the experimental designs and their testing, the critical analysis of the results,... However, the 37% of the students reported they had not done laboratory work at all and only the 27% had practiced at the lab. The remaining 36%, had either seen a demonstration in the laboratory, watched a video and/or had read the script.

Concerning the difficulty of the chemistry contents in its different sections in the 1st year of the degree as compared to High School, most of the students (74%) answered they observed a continuity in the Inorganic Chemistry contents and approximately half of them answered Organic Chemistry was more difficult in the degree. The percentage of the questioned students who declared the contents were
more difficult in the 1st year of the Chemical Sciences degree increased up to 85% or more when questioned about Analytical Chemistry and Physical Chemistry.

4 CONCLUSIONS

Approximately half of the answered Chemistry students (56%) had chosen the degree as their first option. For the rest of the students who chose other options as their first, the cut-off marks for the University of the Basque Country at the campus of Biscay or Alava, were higher than that of the Chemical Sciences in the year 2017-2018.

Regarding the impact that the teaching-learning of the subject had had during the baccalaureate, most of the asked students (72%) depicted the subject Chemistry as attractive in 4 or 5 points out of 5 and the 67% of them considered having had a teacher as good as 4 or 5 points out of 5. However, it was only the 27% of them that had personally performed actual laboratory practice.

Finally, most of the Chemical Sciences students described they deemed inorganic chemistry contents at the degree as a continuation of the studied at the second year of the baccalaureate. Then, most of the students described organic chemistry at the degree as the continuation or more difficult than the studied in the second year of the baccalaureate. Finally, analytical chemistry and physical chemistry were depicted as more difficult in the degree by most of the students. This description should be considered when designing the syllabus of the Chemical Sciences degree, especially in its first year.

REFERENCES

[2] Royal Decree 1892/2008, November the fourteenth, which regulates the conditions of official undergraduate university education and admission procedures to access Spanish public universities.
[6] Decree 127/2016, September the 6th, by which the curriculum of the Baccalaureate is established and is implemented in the Autonomous Community of the Basque Country.