STRATEGIES TO ENCOURAGE STUDENT PARTICIPATION IN SMALL GROUP SESSIONS

E. Rilo Siso, S. García-Garabal, L. Segade, M. Domínguez-Pérez, O. Cabeza

Universidade da Coruña (SPAIN)

Abstract

The progressive integration of the Spanish University System in the European Higher Education Area (EHEA) led to the progressive adaptation of the teaching strategies used by teachers, which also implied the progressive adaptation of the learning strategies of students.

We have introduced some tactics in the design of the small group sessions of the subjects of the Physics Area of the Chemistry Degree. The aim of these teaching strategies is to promote the participation of students in the tasks scheduled throughout the semester included in the continuous assessment of these subjects.

It is important to introduce strategies that motivate the continuous work throughout the semester, as well as the collaborative work among students.

Some of the proposed actions are:

- Work in small groups of students with different levels
- Distribution of specific tasks for each group of students and among the members of a group
- Monitoring the progress and reward through daily scoring of work done

Through these actions students are expected to keep attention by encouraging their active participation in class and by proposing affordable goals that allow them to achieve success gradually with the motivation that satisfaction for the results involves.

After several courses using these strategies we can analyze the results obtained by evaluating the change in student participation, as well as the score obtained in these interactive sessions and also the student’s perception.

Keywords: Interactive sessions, student’s motivation, physics teaching.

1 INTRODUCTION

Since the incorporation of the Spanish universities in the EHEA the planning of the subjects and the structure of the teaching, has undergone great changes. Nowadays, the attention to students is more personalized, and the main task of the teacher is to lead their learning in order to provide the necessary tools to make it meaningful in contrast to the previous model. In that, the role of the teacher was more oriented towards the transmission of knowledge thus the interaction teacher-student as well as the monitoring of the learning process did not exist. In contrast, nowadays the curriculum design of the subjects includes the planning of sessions in small groups. This interactive methodology allows highly participatory sessions with significant learning outcomes [1-3].

In this context, the curriculum of the Physics2 subject of Chemistry Degree of the Faculty of Sciences in the University of A Coruña includes approximately 25% of the classroom sessions in small groups (SG) (10-15 students).

We dedicate these sessions to work on the contents previously explained in the large group sessions (exposition lectures) in which general problems are also proposed. Therefore, we reserve the small group sessions to make other more specific problems and promote reflection and discussion about them among the students. This methodology cannot be carried out without the students' previous work, if they do not brush up the contents given previously, and do not analyze the problems before going to class, they will not be able to comment on them, make questions or discuss them.

During the first courses of the current curriculum, (which began in the 2009-2010 academic year) we verified that the attitude of the students was fundamentally observer, they expected to solve the proposed work in the sessions, but with the minimum possible participation. Although their participation
was requested, only a very small number of students did it voluntarily and they were always the same students. For this reason, we could not achieve the objectives planned for this type of sessions so we have been introducing different strategies. Over the years, so as to change the attitude of the students and promote an increase in the number of participating students, as well as in the number of students attending this type of sessions. We also tried to decrease the dropout rate.

Therefore, the aim of the actions described below is to promote sequenced and continuous learning as well as participation and student motivation through the planning of tasks that require to the student follow the pace of the contents of the subject and allow them to track the process.

Changes in methodology, have been incorporated into small group sessions during the last three courses in the subject Physics 2 for Chemistry degree and have been modified based on the analysis of the success of each action proposed at the end of each course.

2 METHODOLOGY

In the programming of the interactive small group sessions of the subject, the students are proposed to solve 4-5 problems or 7-8 short questions about the contents previously worked during the large group sessions. These problems/questions must be analysed and solved by the students previously to the small group sessions. Then, we propose a number of problems so that the students prepare them completely and on the other hand we can solve and comment them during the session of one hour. We intend to establish as a starting point for each session a clearly defined and easily approachable task on which to focus the questions and reflections of each session.

In addition, different worksheets are prepared for the different small groups and in all of them the solutions are included so that they can improve with autonomous work. We design these collections of problems in a way that they are equivalent among them in terms of the contents worked. We intend that the students try to solve the bulletins of all the groups to help them as self-evaluation to test their knowledge.

During the first five minutes of class we commented in a general way on the success of the task entrusted to that session, to find out the most difficult points. Thus, we could plan the development of the session to emphasize those aspects where we detect more errors of understanding, as well as to analyze which students had more difficulties.

From there, according to the group, the contents to work and the type of issues raised for the corresponding session, we carry out one or more of the following actions:

- Work in small groups of students with different levels
  All classroom students are divided into in small groups of three or four people. The teacher tries to distribute the students so that the formation of the groups is heterogeneous, that means that the groups are formed by students who raised more doubts and those who understood better the reasoning to be done.

  The tasks established for each interactive session are distributed and the students are asked to comment on about the problem or question that has corresponded to them for five or ten minutes. They should list the difficulties they had and, if they solved them, how they got it.

  Next, each group must share their conclusions. During this sharing the other groups comment if they also had the same difficulties and we are solving the questions raised between all. On many occasions it is the students who are responding to the questions of their peers and solving all the difficulties. Other times the teacher raises a question to provoke a reasoning that leads them to the resolution of the question posed.

  In order to apply this methodology it is necessary that the students work previously the contents and the problems posed, otherwise they will not be able to follow the reasoning. The teacher must ensure that all students participate and if not, request the participation of those students who do not.

- Distribution of specific tasks for each group of students and among the members of a group
  As we have already mentioned, the total tasks assigned to each session are shared among the groups formed, so each group will be in charge of starting the analysis and discussion of a specific task from among the scheduled ones. In addition, all group members should be able to explain the reasoning followed and should take turns in this task. This rotation of roles is done to avoid
that it is always the same person who acts as spokesperson for the group. The distribution of tasks is carried out at the beginning of each class so the students do not know what the problem or issue will be assigned to them and they will have to work on it.

- Monitoring the progress of scheduled tasks and reward through daily scoring of work done

Students must know from the first session that their participation will be requested and that it will be evaluated. They should know the percentage of their note that will be assessed in these interactive classes. In the subject matter of this study, it accounts for 15% of the final grade. Since in all the sessions the interventions of all the students are evaluated, we can grant a daily score based on the work done in each session.

- Raising doubts and encouraging debate

Sometimes, teachers do not directly answer students’ questions, but raise new questions to direct their reasoning and we let them expose and defend their hypotheses to encourage debate and reach themselves, through reasoning, to the resolution. In this way, in addition to keeping them active and focused, we achieve more meaningful learning.

- Online questionnaires

Through applications that allow the preparation of evaluation questionnaires, in some sessions competitions are held among the students, with the aim of remembering and reinforcing the contents in a dynamic way. These questionnaires in addition to providing dynamism to the session, motivate the students to prepare the contents and in this way, obtain a good score. In some cases, we also use them to remember contents that for reasons of calendar have not been worked recently (for example after a vacation period).

### 3 RESULTS

As mentioned previously, the actions developed during the last three courses were incorporated gradually in order to evaluate their influence on the set of activities designed for the subject. In this way, we evaluate the influence on the participation of the students in the interactive sessions by means of the average grade obtained in the participation section (15% of the final mark) and also by the daily perception and annotations of the teachers in charge of these sessions. We believe that it could also have influence on the average marks of the subject, since a higher participation and significant learning should lead to better results and therefore we also analyze the average final marks with respect to previous courses.

On the other hand, we analysed possible changes in the attendance to the interactive sessions, as well as a possible influence that the application of this methodology could have in the number of students who stop attending the small group sessions.

<table>
<thead>
<tr>
<th></th>
<th>Average score in participation (%)</th>
<th>Average final score (%)</th>
<th>Dropout rate (%)</th>
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<tbody>
<tr>
<td>18-19</td>
<td>78</td>
<td>-</td>
<td>25</td>
</tr>
<tr>
<td>17-18</td>
<td>76</td>
<td>73</td>
<td>20</td>
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<tr>
<td>16-17</td>
<td>62</td>
<td>72</td>
<td>19</td>
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<td>15-16</td>
<td>60</td>
<td>66</td>
<td>20</td>
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<tr>
<td>14-15</td>
<td>53</td>
<td>68</td>
<td>23</td>
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In Table 1 we see that the average grade obtained by students in interactive sessions increased significantly in the last years, especially in the last two courses where the average grade is greater than 75% maximum score. Although the number of students who passed has not increased with the changes, we can say that the overall average grade of the subject has also increased slightly, as we can see in Table 1. This result seems reasonable and agrees with the increase in the grades of the interactive sessions.
The number of students attending the small group sessions keeps almost constant although we observed a slight increase in the last 3 years, as does the dropout rate, which remains constant and approximately equal to 20-25%.

The perception of the teachers in charge of the interactive sessions is that the change in the way of designing the interactive sessions promotes a greater commitment in the students and the previous work and participation in the sessions has improved. However, it is possible that some students have stopped attending these sessions because they did not the previous work that is very important for their participation in the classes.

In addition, it is also important to evaluate the success of the proposed actions based on the perception of the students. We made a survey to assess which methodologies are more effective, from their point of view, for the promotion of their participation and which ones lead to a better understanding of the contents worked on.

Questions asked in the survey were:

1. Do you attend small group sessions?
2. Do you usually do the scheduled tasks for the SG classes?
3. Do you actively participate in SG sessions?
4. Does the work in small groups help you understand the exercises?
5. What motivates you to do the exercises before the interactive sessions?
6. Do you consider that the methodology employed forces you to maintain attention during class?
7. Do you like to do online questionnaires?

From the analysis of the students’ answers we can extract the following information:

The surveyed students usually attend the interactive sessions, but only 55% do the task scheduled while the 30% only do it sometimes. Of those who do the tasks scheduled for each session, 45% say they do them because they know that their participation will be requested and 55% say they do not solve them for that reason. In addition, 65% of all students who attend admit that they participate only if they are asked for, 80% say that working in small groups helps them to better understand the proposed problems. Finally, 50% of students say that the methodology helps them to stay focused in class always and 40% say that sometimes. Approximately 50% of students like to do online questionnaires.

4 CONCLUSIONS

We have introduced some methodological changes in the planning of the small group sessions (interactive) of the subject Physics 2 of the Degree in Chemistry, with the aim of encouraging the active participation of the students in these classes, the work continued throughout the semester and a meaningful learning. These actions also aim to boost classes and to maintain attention and concentration of students in the subject.

Some of the proposed actions are: work in small groups, posing questions that the students must solve by discussing until they reach their own conclusions, carrying out self-assessment and online test activities and the daily evaluation of the work and participation.

The results obtained both academic and perception of students and teachers, indicate that the measures have had a positive influence, since the global assessment of participation has improved, and the assessment of students also goes in the same direction. In addition, the statistics of the average scores also seem to indicate that, although they do not approve more students than in previous years, those who pass achieve higher grades.

REFERENCES
