Formulation of “questions – answers” in teaching-learning process as a way of improving learning of students at university level

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Introduction

Students have previous ideas, and they project these ideas in their knowledge; a large research has been carried out for different authors: (Brown, Clement, 1987; Carrascosa y Gil, 1992; Cervantes, 1987; Duit, 1991; Cros y Maurin, 1986; Hierrezuelo y Montero, 1991; Pintó, Alibers y Gómez, 1996; Driver y Erickson, 1983; Pozo, Gómez, Limón y Sanz, 1991; Driver, Guesne y Thibergien, 1985; Rennström, 1987) in Campanario, Juan Miguel y Otero, José C (2000).

Also, one of the main things in a process of teaching-learning consists of making hierarchical contents of the programs and to determine specific and clearly which are the objectives of the course. It is not always easy for a teacher to discriminate the relative importance of the program contents. If we consider that the questions the students do are a reflection of what the teachers consider important, the exams could be considered as an adequate source to know their opinion about the contents that a student on a topic should know. Nevertheless, more important than the content itself, is the form in which is evaluated, that is to say the task demanded.

It is always a difficult task for teachers to make a hierarchical about the contents. Nevertheless, the fact that some contents are chosen so often for students and teachers to be evaluated, suggests that there is an unspoken agreement among teachers and their students about the importance of the content and about which questions should appear in the exam. If the students have the possibility to prepare and formulate questions and answers of the subject, probably it will be a deeper learning for them.

Objective

The main objective refers to the improvement of the learning of the university students. Concretely emphasizing the following aspects:

Ø LEARNING OF THE DIVERSE IMPORTANCE OF THE MATERIALS (FUNDAMENTAL IDEAS-SECONDARY-ANECDOTAL, Etc.)

Ø DIFFERENTIATION AMONG LEVELS OF KNOWLEDGE (THE ERRONEOUS ANSWERS ARE NOT EQUAL IF CONSIST OF SMALL CONFUSIONS OR IN SERIOUS ERRORS).

Hypothesis

In this study we considered different hypothesis but the main one was: “The student’s preparation and formulation of questions and answers of the discipline favours an elaborate and deeper learning than the obtained with the study of the class material”.

This hypothesis was tested by comparing the performance of the students in “the final exam of the subject” with the performance in “the formulation of questions and answers of the different themes and contents of the subject”.
The measures utilised were:

Ø Regarding the performance in the final exam, it has been considered the quantitative mark obtained in the exam (maximum 7 points out of 10)

Ø Regarding the performance in the formulation of questions, the following aspects have been considered:

o Quantitative appraisal: level of participation (and or/regularity) with three categories:

§ It does not present questions.

§ It presents to a maximum of 30 questions (irregular means that it has been presented in an irregular form because there are 10 themes and to present less than 30 is not enough).

§ It presents between 30 and 50 questions (regular means that questions were presented in a regular form because by having 10 themes, to present between 30 and 50 is acceptable).

o Qualitative appraisal: level of elaboration, meaning and correction of the questions and answers. These appraisals were collected in terms of marks given to the questions (maximum 3 points out of 10).

Procedure

327 students of two different disciplines directly related to Educational Psychology were involved in the study.

They received two practical sessions about types of questions they had to prepare. Students were then requested to participate in this exercise.

The questions and answers resulting from this activity had to be submitted to the teacher by way of the virtual online teaching-learning system developed in the UAB (University Autonomous of Barcelona). We informed the students that a correct execution would be worth up to three points on the final grade, while the seven remaining points would depend on the grade of the exam itself.

We stated a death line for the submission of the questions in order not to interfere with the normal usual individual work pattern of each student. We dedicated one practical class every four weeks to comment and remark the positive and negative aspects of the questions that had been submitted.

Results

Those students that regularly worked out questions passed the exams, whereas the students that did not pass were mainly those that had not prepared questions, or in some cases, they had been preparing these questions very poorly.

RESULT 1

This scattered chart shows the relationship between both, the quality of the questions and answers (QP) of the students with the marks obtained in the exam of the subject (N_EX).
The amount of points observed in the chart indicates that the higher quality of questions and answers (QP) are related to a better mark in the exams.

**RESULT 2**

In this graph you can see the relationship between the number of questions and answers (NP) of the students obtained in the exam (N_EX)

Since there are a number of points dispersed around the graph, it is not possible to conclude that a higher number of questions presented correlates to a better mark in the exam. However there is also a relationship with both variables.

**RESULT 3**

**Contingency table of the variable “regularity” of students and “to pass the exam”**

<table>
<thead>
<tr>
<th>Regularity</th>
<th>Student Pass exam</th>
<th>Student Fail exam</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No present</td>
<td>18</td>
<td>39</td>
<td>57</td>
</tr>
<tr>
<td>Irregular</td>
<td>6</td>
<td>17</td>
<td>23</td>
</tr>
<tr>
<td>Regular</td>
<td>241</td>
<td>6</td>
<td>247</td>
</tr>
<tr>
<td>Total</td>
<td>265</td>
<td>62</td>
<td>327</td>
</tr>
</tbody>
</table>

“Regularity” have three categories: regular (between 30 and 50 questions presented), “Irregularity” (less than 30 questions presented) and questions not presented.

The Pearson chi-square value obtained equals 179,884, with a significance level (p) below 0,000

This result shows that the value questions presented “regular” is the most related to the value “pass” in the exam, meanwhile the value “do not present” questions show the highest relationship with “not pass” in the exam.

**RESULT 4**

**Correlations**

<table>
<thead>
<tr>
<th>Number P</th>
<th>Quality P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The correlation is significant at level 0.01 (bilateral) 

** The correlation is significant at level 10, 01 (bilateral)

N= 270

The level of highest correlation (r=0.754) is the one observed between “mark in the exam” (N_EX) and “quality of questions” (QP).

In the other hand, the coefficient of determination (r²) indicates 20.25% of exam’s mark variance, meanwhile the question’s quality explains 56.85% of this variance(i.e. 2.8 times more variance)

**Conclusion**

It is important to emphasize that the number (quantity) of questions presented by the students, although is related positively with the mark obtained in the exam, it is not the most noticeable variable in the improvement of their learning. In the other hand, the quality of the questions formulated really maintains a positive and intense relationship with the mark obtained in the exam.

This helps us to conclude that: the formulation of questions-answered shows to be an efficient method to obtain a greater elaboration and use of the material provided, since the student is capable of perceiving the different value of both, what is asked and the answers given, emphasizing the different levels of knowledge and the use of the level that is shown in this activity.

In any case, we cannot ignore the importance of the task to formulate questions even when they are presented in a “irregular” form (less than 30) since the statistical analyses (in this case, ANOVA) indicate that: on average, the “irregular” obtained an exam mark result of 2.31 points more than those that did not present questions. Finally, the “regular” (on average) obtained in the exam of the subject 2.39 points more than the “irregular”.

**References**


Frederiksen CH. Representing logical and semantical structure of knowledge acquired from discourse. Cognitive Psychology. 1975; 7: 371-458


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