

Mathematics and Information Technology. Instructive Exploitation of Internet for the Study and the Self-assessment of Students.

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Abstract

The paper introduces an innovative approach in the teaching of mathematics as well as in the way that students are self-assessed via on – line tests consisting of closed questions. The questions are created by students during their mathematics class. The on– line tests are also formed by the students using the free software Hot – Potatoes during their IT class. The paper also includes comments on the results that came out both of a discussion between teachers and students, and a questionnaire filled out by the students. The discussion and the questionnaire had as a purpose firstly to evaluate this approach, and secondly to check whether this process promotes cross – curricular projects which is among the objectives of contemporary education

Keywords:

Introduction

At the duration of educational process the students are often called to answer in closed questions whether this is an in-class test or a revision examination. Various examples of such questions exist in the web page of Centre of Educational Research [1]. Closed type questions can be easily changed in order to be suitable to present them with the form of a web page. Actually, with the use of a program such as Hot - Potatoes [2], it is possible for the student to be aware of his/her mark, automatically.

Description of procedure

Taking into consideration all the above information, we came up with the idea to assign the students themselves to create the objective type questions, so as to evaluate their knowledge. Afterwards, we assign the students to materialise the questions with the use of the software Hot Potatoes.

Concretely were followed the following steps:

1. Instructive hours of Mathematics

1.1. Delivery of the lessons as it is forecasted by the Ministry of Education. 1.2. Organisation of students in teams of work and the creation of concrete type questions.

1.3. Supervision from the professor of the quality and logic questions in collaboration with the students.

2. Instructive hours of Information technology

2.1. Search and elaboration of corresponding questions in the internet.

2.2. Typing of questions in program of elaboration of text with possibility of import of mathematic symbols.

2.3. Transformation of text in pictures so that the mathematic equations can be published in the internet easily and fast

2.4. Creation of on - line tests with the use of the Hot – Potatoes software.

3. Publication of tests in the web page of school.

4. Self - evaluation of students via tests

It is noteworthy that the students, during the instructive hours of Mathematic, were switching from a true-false activity to a multiple choice , in order to develop the tests, depending on the syllabus .Similarly the students during the hours of information technology were organised in teams with concrete work. For instance, a team undertook the typing while other made the transformation in pictures. Finally concrete team developed the tests with the use of the software. Moreover other students undertook the control and the co-ordination of the procedure and those were the ones that informed the professor for the progress of work. As it happened in Mathematic thus and here the students were switching roles. Narrow collaboration existed between the professors of Mathematics and Information technology, to succeed suitable timing. After the above procedure was fulfilled, for a big part of the syllabus, the students were examined through the formal revision exam. Afterwards students were told to evaluate all the process of means of questionnaire but also extensive discussion with their professors.

Evaluation of procedure

In first phase discussion was held with the students to analyze the results of the procedure. This discussion took place before the formal revision examination and after the internet tests were completed. The subjects that were discussed were the following:

- Interest in the course. Almost all the students marked that the particular process stimulated their interest for the course and that via the creation of questions they were actually forced to read more carefully the book. Remarkably, student of low record alleged that if he/she would not participate in this process, he/she would not have read at all for the module
- Creativity. All the students agreed that with their attendance they promoted their creative and critical faculty. Somebody indeed, with one dose of exaggeration, stressed that now he/she occupied what precisely the particular significances mean
- Comprehension and time of reading. The students claimed that they occupied better and faster the mathematic significances because they should read more intensively the theory and the resolved exercises so that they create the evaluation tests. Furthermore, they agreed at a big percentage that the time of studying in the school was considerably increased whereas the time of studying in the house was decreased.
- Group-work. Beyond from the courses of mathematics and information technology that the students presented better comprehension and deepening understanding , all declared that they acquired an important experience, that of work in terms of working in groups . The entrusting of roles, the alternation of roles, the materialisation of tasks in specific time were elements which helped them to comprehend how they should function in a collaboration.

After the evaluation through the formal revision examination and after the students checked their marks, there was a discussion about:

- Preparation for the examination. A big percentage of students marked that they primarily studied with the help of internet tests. Also they stressed that their study was more effective, which is the basic point, for a revision examination. Even the students that did not have access in the internet supplied the tests and their answers in printed form
- Record. It should be pointed that the majority of students achieved high grades. Most agreed that without the use of internet tests in their study they could not accomplish anything. Others stressed that they could have achieved the same record, but in order to, they should have spent more time

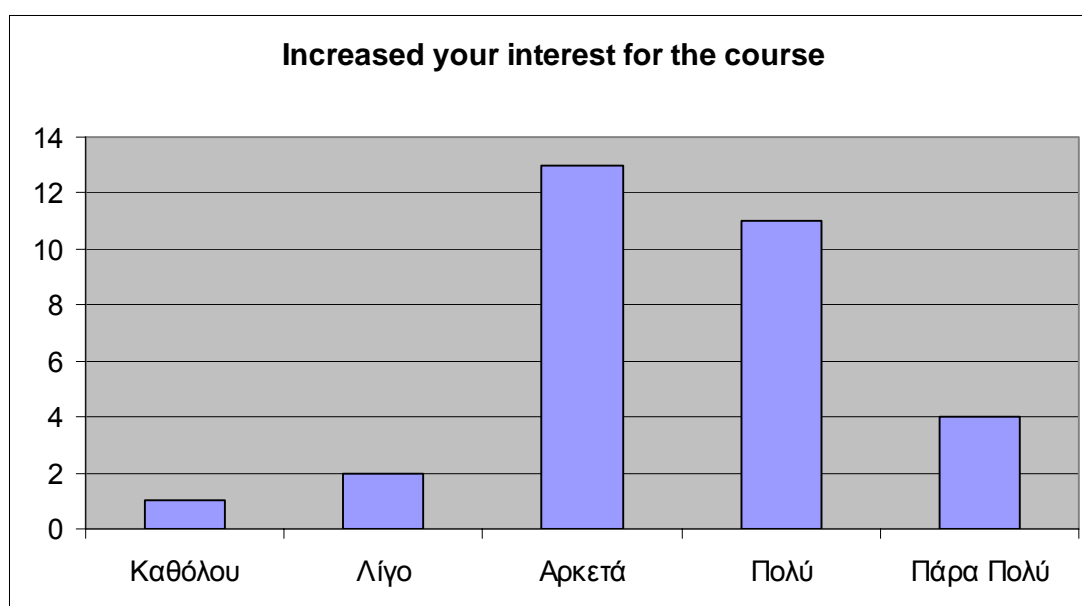
Finally it was discussed if via the development of the internet tests during the hours of information technology modules, improved in the use of New Technologies. The answers were all positive. Students stressed that they were forced to learn the applications better, in which they worked because they had to use concrete possibilities of applications so that they correspond in the work they had to do. Moreover they found more pleasant the course of information technology because a concrete objective aim existed of direct interest that should be materialised instead of some hypothetical script that is usually given in the students during the lessons.

Furthermore, all the students stressed that this method of teaching can also be applied in other courses. They indeed proposed that thus it would acquire interest mainly in theoretical courses. Basically, they admitted that this process promotes διαθεματικότητα, which is the point for a modern school.

Finally a questionnaire was given which again students answered themselves. Of course the number of students that were involved in the particular process was not enough to come out with reliable statistical conclusions. However we can claim that certain results can be valued. The questionnaire is included below.

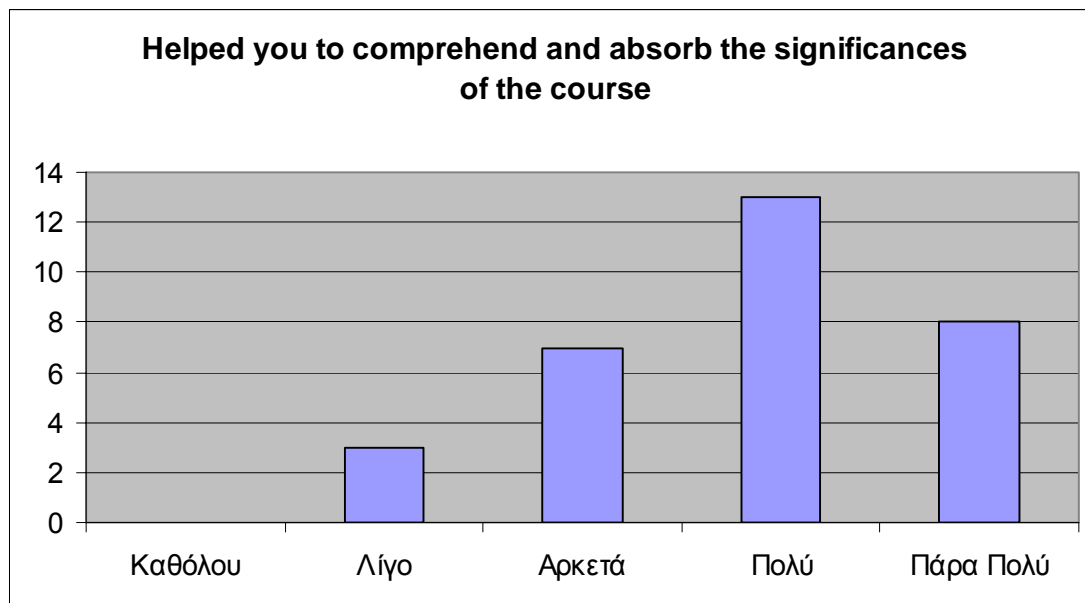
Suggestively we mention certain results from the questionnaire.

Specifically in the question “Increased your interest for the course” the interest increased in a very big degree, as it appears at the following figure.



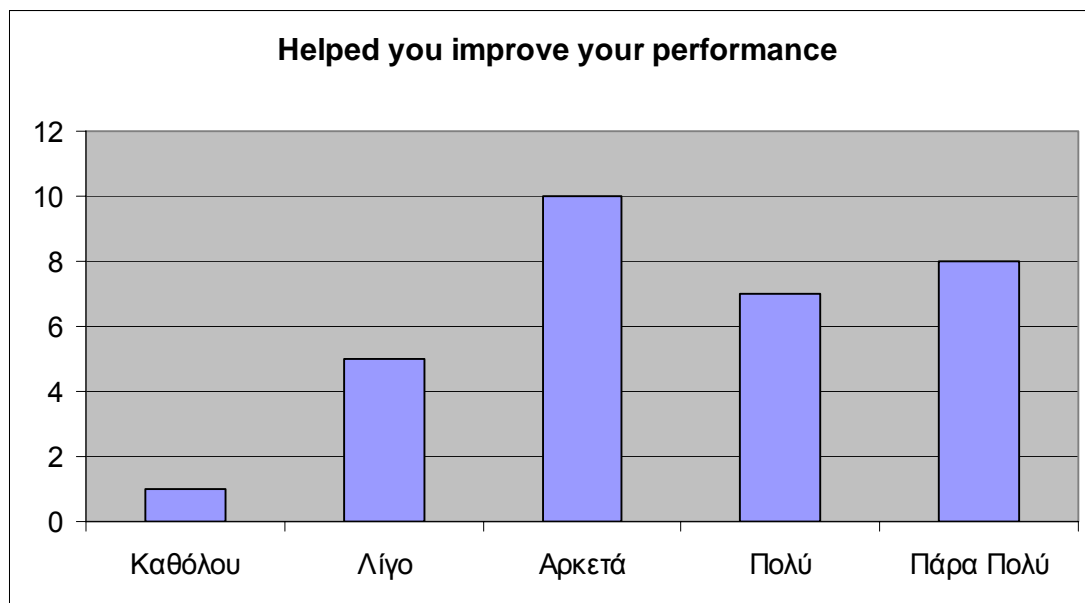
Graph 1

Students agree that the specific procedure helped them to comprehend and absorb the significances of the course better.



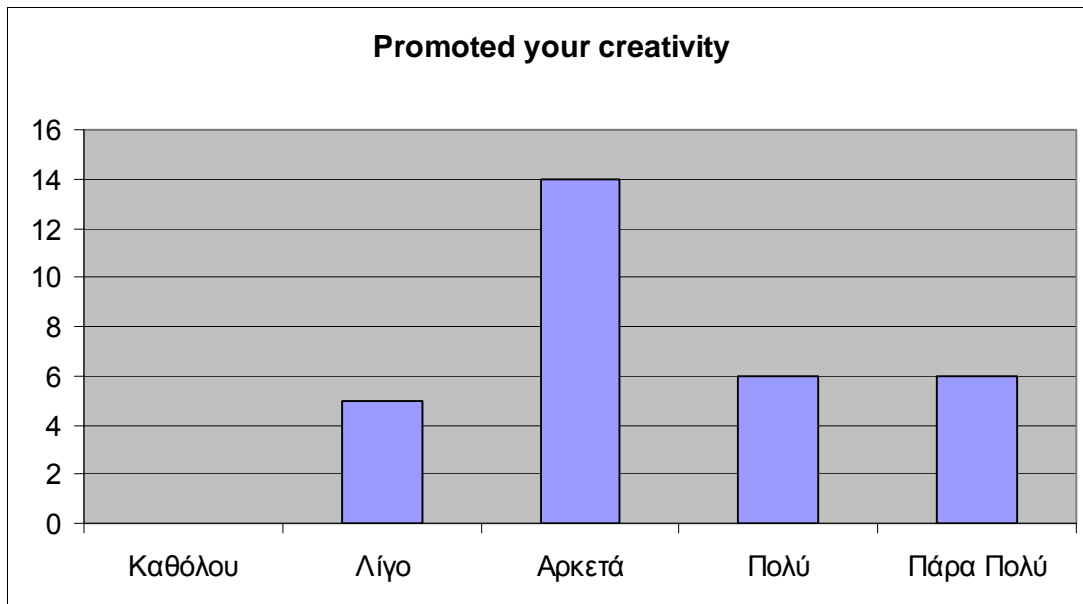
Graph 2

The percentage of students that consider that their performance was improved is also high.

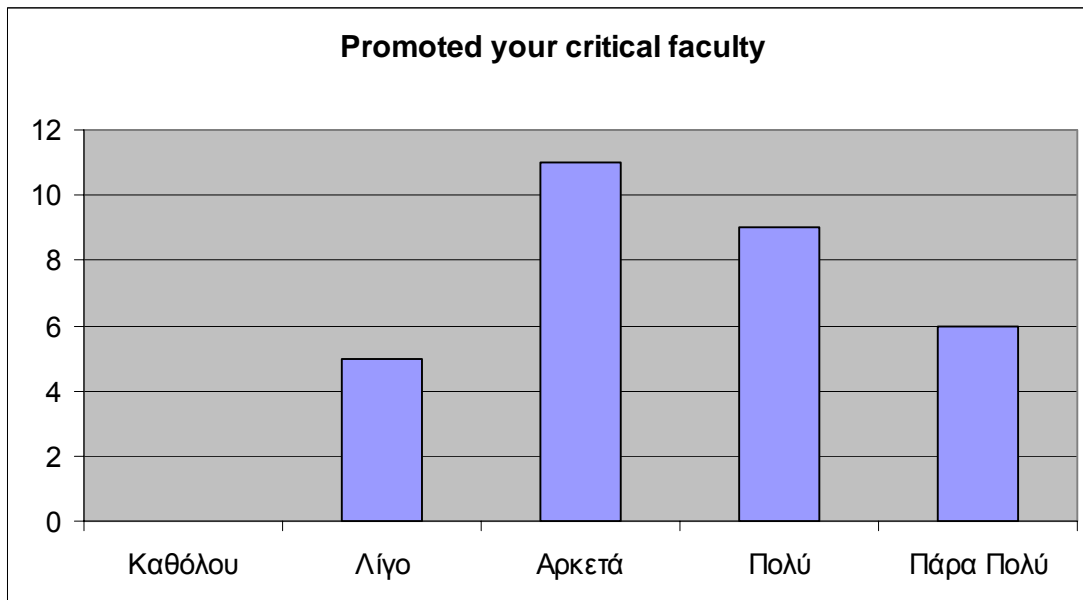


Graph 3

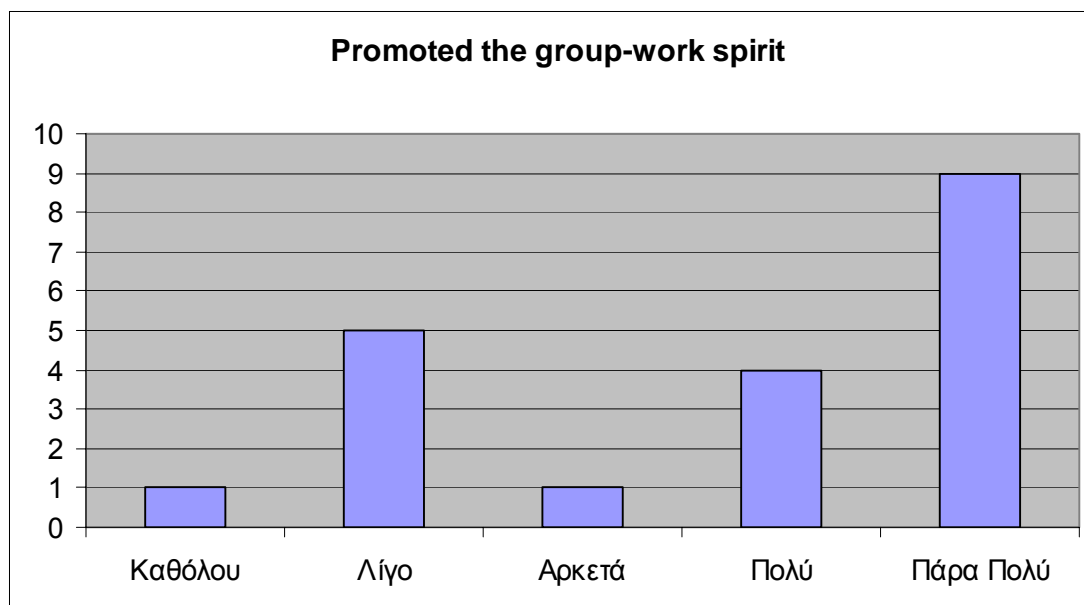
A same percentage or even higher percentage of students believe that through this process creativity, critical faculty and team spirit are promoted. As it appears at the following figures.



Graph 4

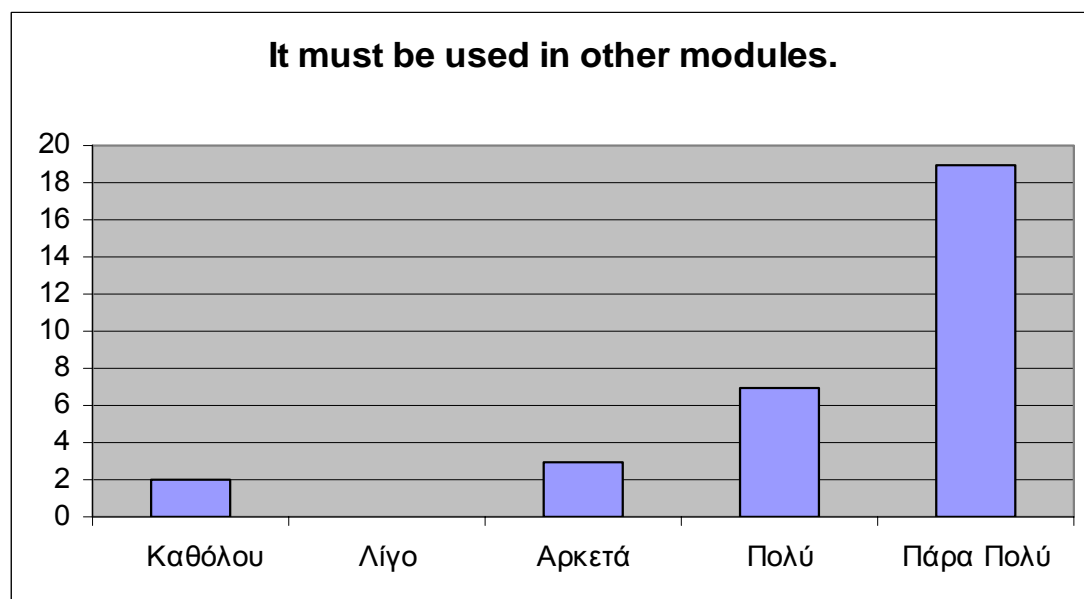


Graph 5



Graph 6

To conclude, the majority of students agree that the particular process has to be used in other courses.



Graph 7

Thoughts about the future.

The experience of the whole process is highly significant and proved that the above mentioned process can also be used in other courses. We will try to share this experience with other colleagues. Furthermore, we intent to create more internet tests in mathematics, for every class of high and senior high school.

Questionnaire

In the following questions answer suitably if the particular process

1. Increased your interest for the course

<i>Not at all</i>	<i>Little</i>	<i>Enough</i>	<i>A lot</i>	<i>More than expected</i>

2. Prompted you to deal with the course at the duration of the instructive hour

<i>Not at all</i>	<i>Little</i>	<i>Enough</i>	<i>A lot</i>	<i>More than expected</i>

3. Helped you to comprehend and absorb the significances of the course

<i>Not at all</i>	<i>Little</i>	<i>Enough</i>	<i>A lot</i>	<i>More than expected</i>

4. Helped you reduce your time of studying at home

<i>Not at all</i>	<i>Little</i>	<i>Enough</i>	<i>A lot</i>	<i>More than expected</i>

5. Helped you in a more qualitative study

<i>Not at all</i>	<i>Little</i>	<i>Enough</i>	<i>A lot</i>	<i>More than expected</i>

6. The use of self-evaluation Internet tests helped you prepare better for the formal revision examination

<i>Not at all</i>	<i>Little</i>	<i>Enough</i>	<i>A lot</i>	<i>More than expected</i>

7. With the use of self-evaluation Internet tests, helped you cover gaps from any of your absence

<i>Not at all</i>	<i>Little</i>	<i>Enough</i>	<i>A lot</i>	<i>More than expected</i>

8. Helped you improve your performance

<i>Not at all</i>	<i>Little</i>	<i>Enough</i>	<i>A lot</i>	<i>More than expected</i>

9. Promoted your creativity

<i>Not at all</i>	<i>Little</i>	<i>Enough</i>	<i>A lot</i>	<i>More than expected</i>

10. Promoted your critical faculty

<i>Not at all</i>	<i>Little</i>	<i>Enough</i>	<i>A lot</i>	<i>More than expected</i>

11. Promoted the group-work spirit

<i>Not at all</i>	<i>Little</i>	<i>Enough</i>	<i>A lot</i>	<i>More than expected</i>

12. Helped you comprehend the rules of functioning in team

<i>Not at all</i>	<i>Little</i>	<i>Enough</i>	<i>A lot</i>	<i>More than expected</i>

13. Helped you familiarize yourself with the technologies of Information Technology and Communications

<i>Not at all</i>	<i>Little</i>	<i>Enough</i>	<i>A lot</i>	<i>More than expected</i>

14. It gave you reasons to learn new applications

<i>Not at all</i>	<i>Little</i>	<i>Enough</i>	<i>A lot</i>	<i>More than expected</i>

15. Helped you learn how to search and elaborate information in the internet

<i>Not at all</i>	<i>Little</i>	<i>Enough</i>	<i>A lot</i>	<i>More than expected</i>

16. Helped you learn how to handle tasks that require the use of many applications.

<i>Not at all</i>	<i>Little</i>	<i>Enough</i>	<i>A lot</i>	<i>More than expected</i>

17. It can also be used in other modules

<i>Not at all</i>	<i>Little</i>	<i>Enough</i>	<i>A lot</i>	<i>More than expected</i>

18. It must be used in other modules.

<i>Not at all</i>	<i>Little</i>	<i>Enough</i>	<i>A lot</i>	<i>More than expected</i>

References

1. <http://www.kee.gr>
2. <http://hotpot.uvic.ca/>