

**INITIAL TRAINING FOR TEACHING MATHEMATICS
INTEGRATING DIDACTICS OF ALGEBRA AND
E-LEARNING PLATFORM**

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ABSTRACT. Teachers' initial and continuous training is a very complex challenge both for the theoretical specialists in this field and the ones that can contribute by offering examples of good practices.

The Didactics of Mathematics, as an intersection point of Mathematics and Educational Sciences, is a domain which integrates objectives, themes and educational strategies (methods, educational instruments, organisation structures of the pupils, evaluation methods and instruments) in order to guide every pupil for a an efficient development, by setting his motivation for learning Mathematics.

The initial training of different categories of teachers or inspectors, engineers or other professional categories in order to develop specific competences for teaching mathematics, represents one of the main objectives of the project "Professional training of teachers in the pre-university education system for new opportunities of career development", contract number POS-DRU/57/1.3/S/32629. The present research is a part of this project and its main purpose is to identify the participants' opinion regarding the efficiency of the module "Didactic of Algebra" in the "Mathematics program" and of e-learning platform in developing the specific competences for teaching mathematics. The instrument that we used was a questionnaire which was elaborated considering the two main directions. It was sent to the participants of this module by e-learning platform. The results showed the main strengths of this program but it also revealed some improvements that can be done in order to increase the performances of the participants to this program.

Key Words: initial and continuous training, mathematics, didactics, efficiency.

1.INTRODUCTION

In every society, Romanian or European, there are institutions which have a great value and importance in developing and evolution of all its components, by implementing elements, principles and norms that promote the good, the truth and the beauty (the three ancient values). One of these institutions, which promote such values, is university, as an important centre for the initial and continuous training of teachers.

We talk today about a "learning society", "permanent education" and so on and, for this, we need to understand that we cant have a society like this if we cant prepare ourselves for a continuous training in order to face the dynamics of our society. The first step for a learning society is represented by teachers who learn, teachers that are participating to continuous training programs, who learn in order to learn others.

Teachers' participation to continuous training programs is a result to their willingness to learn, to develop their competences or to form new ones in order to be able to teach something narrow to their specialization. The project entitled "Professional training of the pre-university teachers for new opportunities in their career development" is a response to the deep need of so many teachers in pre-university system to have access to a second specialization. The participants of this project attend a two years training program, adjusted to the technology of distance education in order to obtain a second specialization as a support for their didactical career.

The project contributes to a better training level for students who can benefit of the didactical staff trained in interactive teaching-learning methods, centered on the student and using TIC information-communication technologies in the didactical process, to the stimulation of didactical staff to participate to continuous training and the development of a life-long learning culture.

In a knowledge society, the project develops a coherent professional training policy for the didactical staff in secondary education, thought professional conversion programs on a post-graduate level, with long-distance education characteristics. With the suggested theme, the project contributes not only to the increase of the training level of didactical staff, but also to the promotion of a responsible, pro-active attitude, which should generate a change in mentality, according to the requirements of a didactical career.

The Didactic of Mathematics, a border discipline of knowledge with Mathematics learning theories, Psychology of education and Pedagogy deals with

the study of modern mathematical concepts for the teaching of Mathematics at school, with the problems involved in the organization, communication, evaluation of mathematical knowledge.

Today, when Mathematics is the language of science the Mathematics Education is a key activity.

Mathematics Education can be seen as a social activity that takes place in specific institutions and carried out by qualified professionals. In this case, Mathematics Education is understood as a whole set of actions and conditions that make the teaching of Mathematics possible. Therefore, it covers the set of knowledge, processes and conditions that allow the student-teacher interaction about mathematics topics to take place in the Mathematics class, thus, making the teaching and learning of Mathematics feasible. Mathematics Education refers, in this case, to an activity which is intentionally used to build, understand, transmit and assess mathematical knowledge. In this area, it is related to the analysis and study of the conditions that are required to teach and learn Mathematics. Teachers' knowledge and professional development is a central issue (Llinares, S., 1991; Garcia, M., 1996).

The "Didactic of Algebra" module's purpose is to offer possibilities to improve the didactical approach for mathematics class.

Thanks to this project, Secondary teachers have been trained to teach Mathematics.

2. METHODOLOGY OF THE RESEARCH

The main objectives of our research are: identification of teachers' opinion towards the efficiency of the "Didactic of Algebra" module, identification of teachers' opinion towards the efficiency of e-learning platform in developing the specific competences for teaching mathematics.

For our purpose, we selected 26 participants, all teachers who attend the "Mathematics" program in this project. The distribution of participants was according to the next criteria: gender (6 males and 20 women) and age (26 to 56 years old, the average 41,50 years old). Another criteria was level of education and, as it can be seen from the graphic, in figure 1, most of the participants have graduated a bachelor degree (53% of the participants).

Most of the participants have graduated institutions with technical or real profile and only a few participants have graduated humanistic profiles as it can be seen in figure 2.

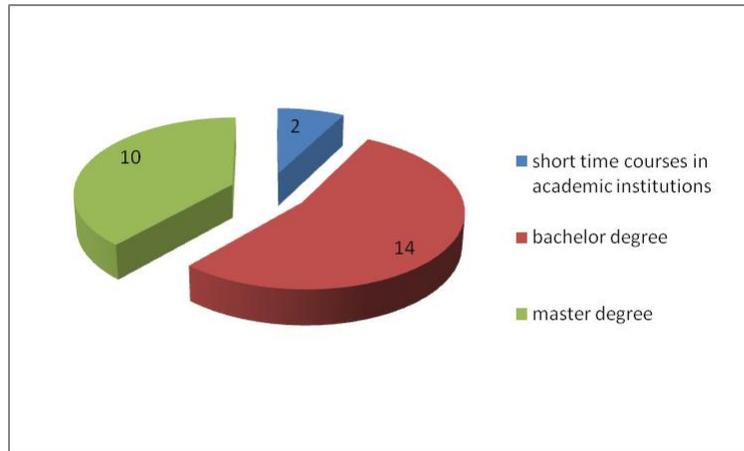


Figure 1: The distribution of participants by level of education

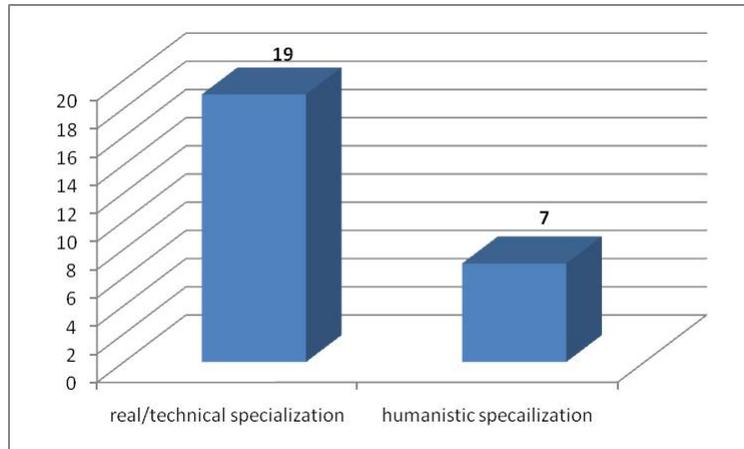


Figure 2: The distribution of participants by specialization

19 participants are teachers in secondary school, 5 in primary school, 1 is a preschool teacher and 1 is principal. We also asked the participants to tell us how many years they have in the work field (3 to 33 years, the average 18,77 years) and for how long they work in the present institution (1 to 27 years, the average 12,27 years).

The participants filled out a questionnaire with 10 questions and 39 statements based on their experience in this program. The questionnaire was sent to them on-line, using the e-learning platform, and after completed it, the participants send it to us by e-mail.

3. THE PRESENTATION AND INTERPRETATION OF THE RESULTS

First of all, we tried to identify participants' opinion towards the efficiency of the module "Didactic of Algebra" in developing their competences to teach mathematics. The competence is composed of knowledge, capacities and attitudes towards this domain. We ask the participants to appreciate the measure, in which they know mathematical concepts such as "sets", "numerical computation", "algebraic calculation", "functions", "inductive reasoning", "graphical readings", "problem solving".

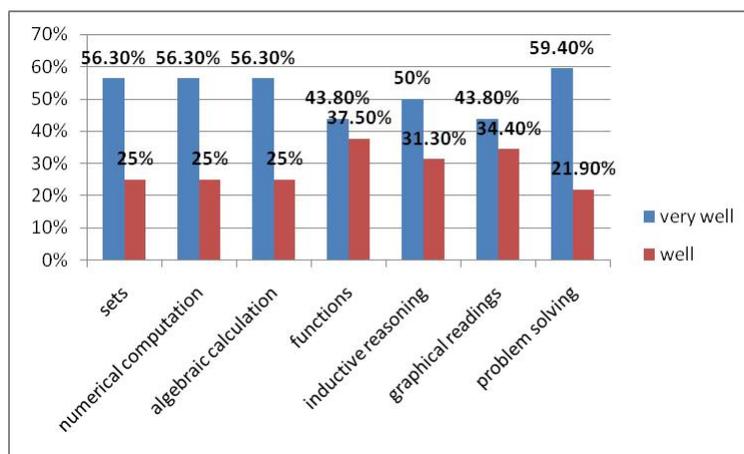


Figure 3: The opinion of participants towards knowledge of the mathematical concepts

As we can see in figure 3, most of the participants think that they know the mathematical concepts very well. This can be also a result of the fact that

most of them are graduates of technical or real specialisations and those concepts were also approached in their initial training. However, at another item of our questionnaire, we asked the participants to exemplify those concepts. According to the evaluation criteria, the results were: 3 answers of 6 points out of 10, 1 answer of 7 points, 4 answers of 8 points, 2 answers of 9 points and 16 answers of 10 points. The results match with those from the last question in a very big proportion.

The next step was to identify the opinion towards the mathematical capacities of participants, so we asked them to appreciate in which measure they think that they have such capacities. The results are presented in figure 4. and reveal the fact that most of the participants think they have the necessary mathematical abilities. Regarding to the participants' opinion towards their

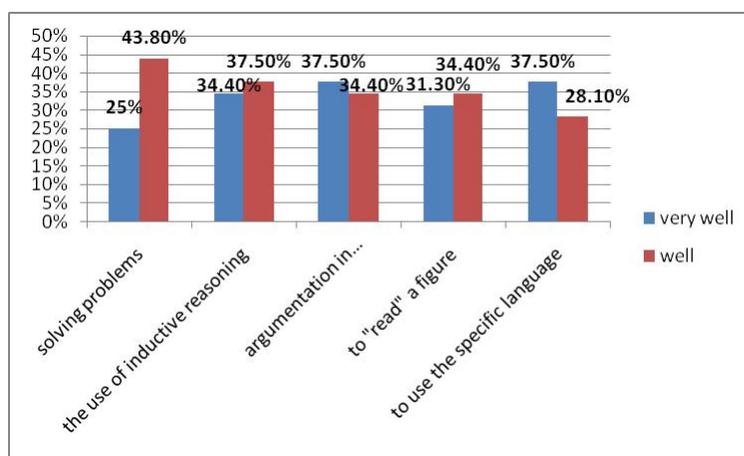


Figure 4: The opinion of participants towards mathematical capacities

abilities to teach mathematics, the results revealed the fact that most of them think that they are prepared to teach in this domain, as follows: * 65.6% of participants think that they are able to use the educational guide in order to project the future educational activities with pupils (total agree)

* 53.1% of participants think that they are able to project a learning unit in this domain (total agree)

* 56.3% of participants think that they are able to project an algebra lesson for secondary level (total agree)

* 59.4% of participants think that they are able to organise and implement an educational activity in order to respect the differences between pupils and

to value each one of them (total agree)

* 59.4% of participants think that they are able to organise the educational content according to the interdisciplinary principles (total agree)

* 65.6% of participants think that they are able to use the specific methods and means of teaching algebra (total agree)

* 68.8% of participants think that they are able to make an evaluation test for algebra (total agree)

* 50% of participants think that they are able to prepare the students for evaluation in this domain (total agree)

* 65.6% of participants think that they are able to use different evaluation methods in order to respect the individuality of every student (total agree). These results confirm, on one side, the efficiency of the module "Didactic of Algebra" from the point of view of knowledge and abilities of most of participants. On the other hand, we can consider these as a result of the fact that the most of participants are teachers and it was easy for them to transfer their knowledge and abilities in this particular domain. We can't forget that this is a training program for teachers in order to achieve a second specialization, so they have some educational knowledge and abilities.

The last element of the competence is attitude. We asked the participants to evaluate the degree in which they are agreeing with some affirmations. In the figure 5, we present the number of participants who agreed or not those affirmations.

The results indicate that there are some prejudice regarding teaching mathematics and the difference between children. In every specialization, it is important to have a good teacher, who knows and can adapt the language, the explanations, the tasks, the evaluation to the individual evolution and development of every student. This is one of the main principles of today's education in every corner of this world. But, also it is very important to know and respect the child's development in order to obtain performance and to be sure that he will be able to know and do something good at the end of the day. You can't have one without the other is like an equation.

Special need education doesn't mean always intellectual difficulties. It might be a physical obstacle which doesn't necessarily mean an intellectual difficulty in attending mathematical classes. A very good example is famous physicist Stephen Hawking who has a motor neurone disease but, in spite of that, he continues to combine family life and research with an extensive program of travel and public lectures.

Affirmation	Total agree			
Every child has the right to individualised education according to his stage of development	23	71.9%		
	Partial agree		Partial disagree	
The children with a lot of energy have better results in the mathematical domain then the weaker children.	11	34.4%	4	12.5%
	Partial agree		Partial disagree	
Mathematics is a very difficult domain which cannot be learned by everyone.	8	25%	10	31.3%
	Partial agree			
Mathematics is a domain where the most important thing is the way the professor teaches.	15	46.9%		
	Partial agree		Partial disagree	
The children with special needs cannot learn mathematics.	4	12.5%	9	28.1%
	Partial agree		Partial disagree	
Mathematics is a domain where the most important thing is the abilities of the children.	11	34.4%	7	21.9%

Figure 5: The attitude of participants regarding different aspects of teaching

The second objective of this research was to identify the efficiency of e-learning platform from different point of view. The results are presented in figure 6.

Point of view	Total agree	
	Project information access	24
Access to the information of the module "Didactic of Algebra"	26	100%
Access to the schedule of this module	26	100%
Access to the educational guide	26	100%
Access to the information regarding the teachers of this module	24	92.3%
Communication between participants	19	73.1%
Communication between participants and teachers	23	88.5%

Figure 6: The participants' opinion regarding the efficiency of e-learning platform

As we can see from this table, the e-learning platform is a very efficient one, especially from the communication point of view. The long distance learning requires a very good communication, especially written because the tasks, the educational content and the methodology are special in this case.

The last objective was to identify the main strengths and weakness of the module and of the e-learning platform. In order to accomplish this, we asked the participants to write three strengths and three weakness, both for the module "Didactic of Algebra" and for the platform.

The results obtained for the module can be classified in many categories, as follows:

Strengths

- * the educational contents (structure, modernity, innovation, coherent)
- * the practical approach (explanations, clarifications, methodology, educational means)
- * accessibility of the content (information, clarity, presentation, accessibility of language, terminology on the domain)
- * evaluation (tasks, auto evaluation tasks, reflection tasks)

Weakness

- * evaluation (too much homework, very complex and difficult tasks)

- * time (very limited time for tasks and individual study)
- * it can't replace the effective work in classroom with students practice is very important in order to develop competences for teaching mathematics.

For the e-learning platform, the main strengths and weakness are:

Strengths

- * accessibility
- * communication (between students and teachers, between students)
- * security
- * a very good structure
- * with a very fast feedback

Weakness

- * technical problems
- * the lack of interaction with others modules
- * limited capacity of uploading documents.

4. CONCLUSIONS

The continuous training of teachers is a very challenging task for every project or institution who wants to complete it. There should be also a priority for educational policies in order to adapt to the new legal methodologies in this domain. A project such as this is a very valuable one because it is a great opportunity for teachers to develop their competences in order to obtain a second specialization. It is not a perfect project, but its many strengths try to compensate and adapt in order to reduce its weakness.

5. ACKNOWLEDGEMENTS

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