

Tania TONOVA, Sofia

## **An Attempt of Actual Education of Mathematics Teachers**

The subject of this paper is the quality of education of teachers and especially of math teachers, according to the requirements of the European Council for the future role of the equation.

A short analysis of contemporary education systems is considered from point of view of the formulated priorities.

It is described practical lessons for the teachers' preparation where we pay attention simultaneously on

- cognitive models;
- mathematical problems;
- information technologies.

### **Introduction**

European Council outlined three strategic tasks in the field of education and determine connected with them priority domain. The first strategic task is "Raising the quality and effectiveness of the educational system in Europe" and corresponding priority domains are:

- ✓ Raising teachers' qualification;
- ✓ Creating abilities for life in the society, based on knowledge;
- ✓ Assurance of an access to ICT for all;
- ✓ Reconstruction of the interest to mathematics, science and technology;
- ✓ Optimal usage of resources.

Positive results connected with these tasks can be expected after complex actions over five priorities, for example teachers' qualification by means of including ICT in their programs and in this way to reconstruct the interest towards mathematics and science and optimal usage of more resources.

One serious problem in the most educational systems during the last couple of decades is the orientation to memorization and reproducing but don't provoke thinking, self-conscious and forming abilities. In the contemporary dynamic developing world significant volume of "ready" knowledge is not too precious and it is not for successful social realization in the concurrent environment. Successful attempt towards changing these practices can be based over well prepared, modern thinking teachers, realizing their complex role of organizers, managers, advisers, partners of students in their orientation in informational boom. To be such teacher they have to be taught to be ready to play such role in the society.

## 2. The teacher as mediator

The qualitative education supposes continuously upgrading the knowledge and the abilities with the aim maximal developing of the individual potential. To play their role teachers firstly have to distinguish individual peculiarities of their students and secondly to partner with them during resolving raised problems. On one side the teacher has to formulate the base statement and to demonstrate effective algorithms, but for the other side has to provoke the mental activity and developing of any of the students. The support of this delicate balance is one of the greatest challenges of the craft of a teacher. Contemporary didactics as a result of accumulated experience from ancient times to nowadays and continuously searching suggests different mutual complimentary methodologies and approaches. By applying them the teacher could come to harmony between obligatory character of common knowledge and routine technique from one side and from the other side – motivation of the students to face in front of intellectual challenges. Such tendencies are the project–orientated education, individual–orientated approach, constructivism, social constructed pedagogy, discovery learning, learning by doing ext. But how these tendencies have to be combined with the specific subject domain and how they could be used in real practice in a classroom is an essential part of the preparation of the contemporary teacher.

## 3. Description of the experimental practice

One part of the education of the teachers is realized in the following schema:

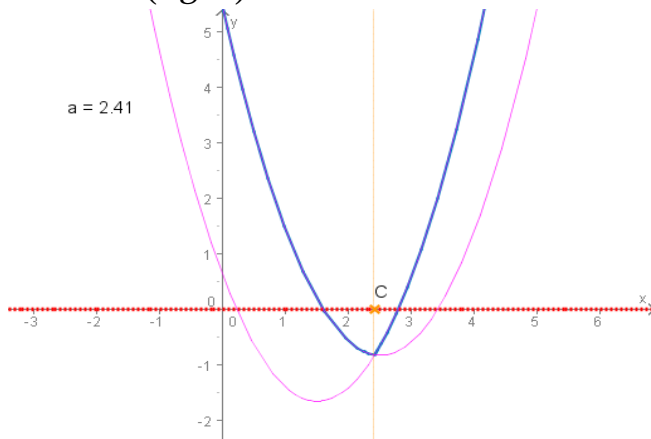
1. By using suitable mathematical problem a problem situation is created, in which students work by themselves.
2. Obtained results are analyzed by the teacher according to two criteria – applying different mathematical approaches and showing different types of intellect (i.e. cognitive models) [1].
3. By using dynamical mathematical software [2] the problem situation is visualized and also the different approaches for its resolution.
4. The students became familiar with their results and the obtained analyses.

Let's give an example. To about 50 students following problem for self work has been given [3]:

“Find the value of a parameter  $a$ , such that the inequality  $x^2 - 4x + 3|x - a| \geq 0$  is valid for arbitrary value of  $x$ .”

The analyses of the obtained results showed that mainly four different approaches were used that correspond to four different types of intellect.

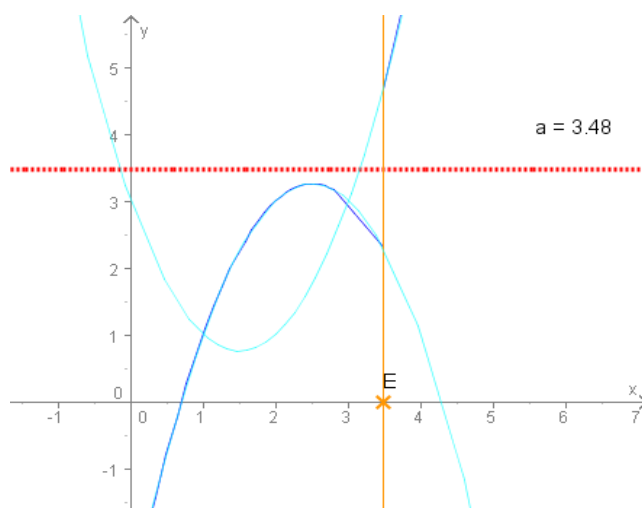
I. Applying theorems of distribution of the roots of the quadratic trinomial (fig 1.).



The approach is used by students with assimilative style of learning. It is characterized by the capability to use theoretical methods and for such students the main reason is to have theory and to apply this theory strictly.

Fig. 1

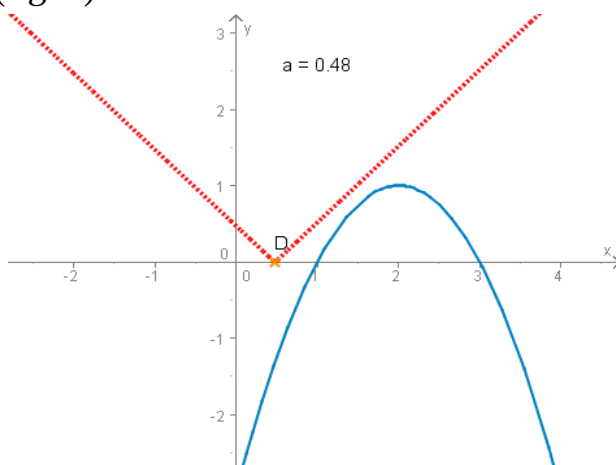
II. Using the approach “isolation of the parameter” (fig. 2).



This approach is applied by students with accommodative style of learning. It has adaptive character, distinguished by searching concrete possibilities, taking risks and undertaking actions.

Fig. 2

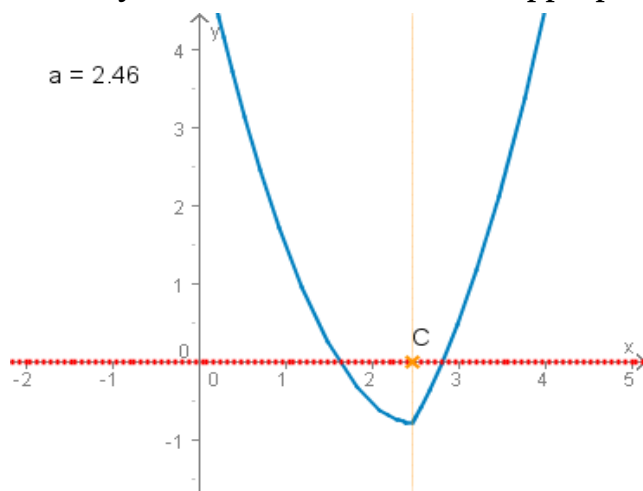
III. Investigating the mutual disposition of the graphs of two functions (fig. 3).



This approach is applied by students of convergent style of learning. In this style knowledge is organized in such a way that by hypothetic-deductive way (i.e. by if-then scheme) they go to resolving specific problems.

Fig. 3

IV. Boundary the minimal value of an appropriate function (fig. 4).



This approach is applied by students with divergent style of learning. They are inclined to act “brainstorming” methods. By using their imagination they are capable of creating nice and original solutions to concrete problems.

Fig. 4

As a whole there were established not so successful problem solving results. Big part of the students did not manage to orientate in mathematical situations, they showed unstable knowledge of the method of solving problems and after that impossibility to reach the chosen approach to the successful end. Dynamic mathematics with visualizations can help students to

- do heuristics analyses of problem situation;
- to stabilize the logical structure of the processes of problem solving.

#### 4. Conclusion

There is an opinion that teachers teach their students in a way that they had been taught. That is why our aim is the contemporary teachers to have good mathematical preparation, to understand intellectual qualities and abilities of the individuals, to master some different skills especially in the area of the ICT.

#### References

- [1] John R. Anderson, Cognitive Psychology, Worth Publishers, 2000
- [2] [www.geonext.de](http://www.geonext.de)
- [3] Амелкин В.В., Рабцевич В.Л., Задачи с параметрами, Минск, Асар, 2004