

# Use Geogebra In Primary Pupils Training

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The GeoGebra application can be used in mathematics training of younger pupils. It can be organized research activity of children with models GeoGebra. We determine the series of conditions for models and show some models taking into consideration of the conditions.

**KEYWORDS:** conditions, primary school, research activity.

One of the important tasks of primary school is expanding pupils' experiences in research activity. The whole child's development is continually connected with the human environment exploration when a child forms his/her views about it. In primary school natural curiosity and research activity of a pupil is combined with training problems solving as well as the formation of subjects views, knowledge and skills.

Primary mathematics training system concentrates mostly on arithmetic which is the basis for the formation of algebraic concepts and geometry elements. The main learning difficulties are associated with geometric material which is the basis for the formation of space thinking and studying properties of geometric objects.

Results of many studies show that young pupils are read to learn with a wider class of geometric objects, to learn better than its required by curriculum.

That is why one of the components in preparation of a pre-service teacher for primary school at our university is learning GeoGebra facilities and development computer support for educational research by primary school pupils.

At their university classes pre-service teachers create special interactive models in GeoGebra taking into consideration the series of conditions:

The first condition is:

- developed interactive models should generate pupils' interest.

The matter is a child who works with an interactive model is unobtrusively involved in educational and cognitive activity. It is important to emphasize that a pupil is got involved in this activity by not direct teacher's instructions, but on his own desire to resolve the situation occurred on a computer screen. Plot design of a training material encourages him to educational activities. These actions require to reveal subject knowledge and skills as well as the ability to apply them to a new environment. The combination of training and practical purpose that is achievable and understandable for a child gradually transforms into the learning motive. Such a transformation is promoted by the circumstance that at summarizing the work of a child with a didactic model his attention is focused on the importance of the knowledge and skills that have helped to achieve a successful outcome.

In primary school it is crucial to include pure life realities into the content of learning. It provides implementation of the didactic principle of training and practice connection.

Interactive models allow applying a learning task with all its attributes: for example, travelling cars, a chocolate bar that is being eaten, a pie which is being divided etc. A pupil can move the car, cut the pie in different ways, and divide the chocolate bar.

Electronic resources allow expanding the diversity of training tasks, suggesting the problem having various solutions. So a pupil is assigned not only to solve the problem correctly, but also to make a rational choice of the method of its solution.

The second condition to be taken into consideration at interactive models design is the following:

- models should be visually presented to create pleasant emotional background;

Child's emotions at classroom activity have a significant impact on it. Emotions initiation of primary schoolchildren usually is associated with a particular situation. It might be nice visual design, familiar objects or characters, valid comments. All this calls up a pupil's pleasant feelings.

Formation of positive emotions and aesthetic senses is also promoted by the series of techniques. They include friendly interface of didactic interactive models, harmoniously picked up colors, using of special techniques to attract and focus pupil's attention, to develop his imagination, thinking, and memory. A positive emotional background of a child's learning

with interactive models is also guaranteed by the possibility to cancel his actions at any moment and to return to the previous step. A pupil has an opportunity to feel free doing his trials at searching right or effective task solving. He is not afraid of any negative consequences. It promotes creation of a pupil's positive emotions, forming his persistence and confidence.

The third condition to be taken into consideration at interactive models design is the following:

- problem definition should involve pupils into critical analysis of input data as for their adequacy, redundancy, actuality;

For this purpose, the developed models have redundant information and tools so that the child's could choose what he needs. For example, additional measurements, additional data etc.

Next condition is:

- interactive models should allow pupils to operate free – to perform transformations of geometric solids (rotate, drag, resize them);

The peculiarity of primary pupils' perception is a close connection with an action. For schoolchildren, especially in their 6-7 years, to perceive the subject means to do something with it, for instance, to touch, to rotate, to change. Practical actions play a significant role for the development of child's cognitive processes. Therefore an interactive model should allow manipulation with objects of learning.

Interactive model which are focused on research activities of pupils should provide possibility of the figures transformations such as rotation of geometric shapes, overlapping some shapes on others for their comparing and resizing. Making changes with shapes meets the need of a child to experiment. At the same time it allows to see results of his activities and to make his own conclusions.

Some additional conditions to be taken into consideration at interactive models design are:

- developed interactive models should provide support (step by step assistance) of pupils' activity to achieve success and completeness at tasks performing;

- developed interactive models should provide an opportunity to verify the correctness of the obtained result.

To succeed in learning it is important for a child to have an opportunity to achieve his intended result. Timely assistance is crucial for pupils who have just started learning. Developed interactive models contain elements that provide necessary support for a pupil. Every child who works with the model can get help in time.

Child can get help after his request in the form of textual commentary, additional constructions, and solution. The system of multi-level assistance in electronic teaching resources focuses on achievement the result by each child.

On the other hand training should be accompanied by overcoming difficulties feasible for a pupil. Depriving a pupil of difficulties we however deny him feeling joy and pleasure of success gained through his own efforts. Difficulties in the process of learning are essential to meet the pupil's needs in cognitive activity. Therefore, pupil's assistance at difficulties should be dosed - not excessive but sufficient to support his efforts and aimed at making him overcome obstacles himself. Pupils in their learning activities should not act on a pattern and algorithm and retain the right to initiative, possible errors and their correction. A pupil should be relaxed in his own actions. The experience in this activity is now appreciated higher than well learned rules in solving typical tasks as this experience teaches a pupil how to acquire knowledge.

Taking dosage help for pupils in interactive models is a complex task and is currently being implemented fairly rare, but it is this assistance will help the developing initiatives to identify creative abilities, creating strong-willed child. Successful and progressing school children can ensure with preservation maximum available to overcome difficulty level tasks for school children.

The developed materials are tested by the students during teaching practice and are available for primary school teachers. We think that the experience of future teachers for the development of these models will be useful for them in their professional activities.

There are some figures of models, that were developed in accordance with the defined conditions.

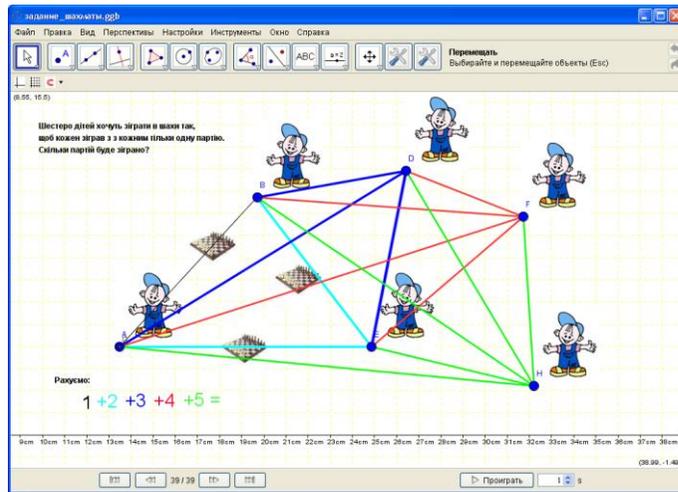


Fig 1. Model for task about chess: Six children want to play chess so that everyone plays with each player once. Find how many parties will be played.

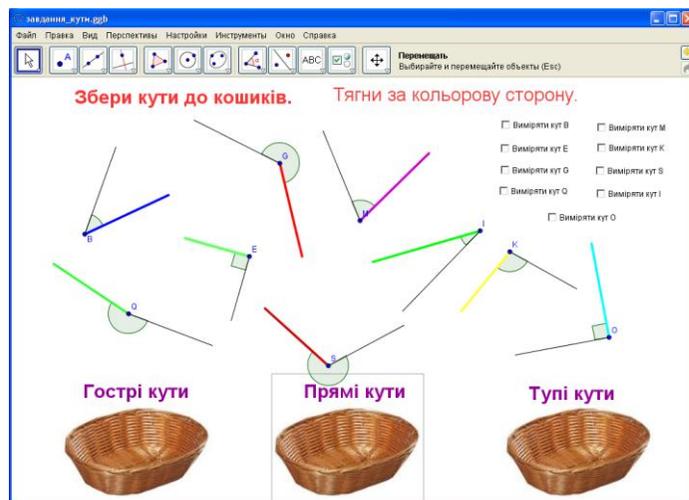


Fig.2. Model for task about angles. Children collect right, obtuse and acute angles into baskets

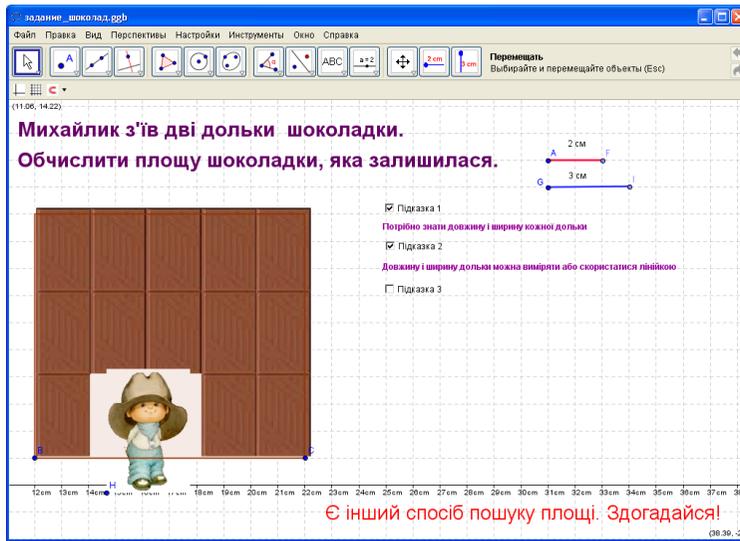


Fig 3. Model for task: Michail has eaten 2 pieces of chocolate bar. Find the square of the chocolate bar that remained.

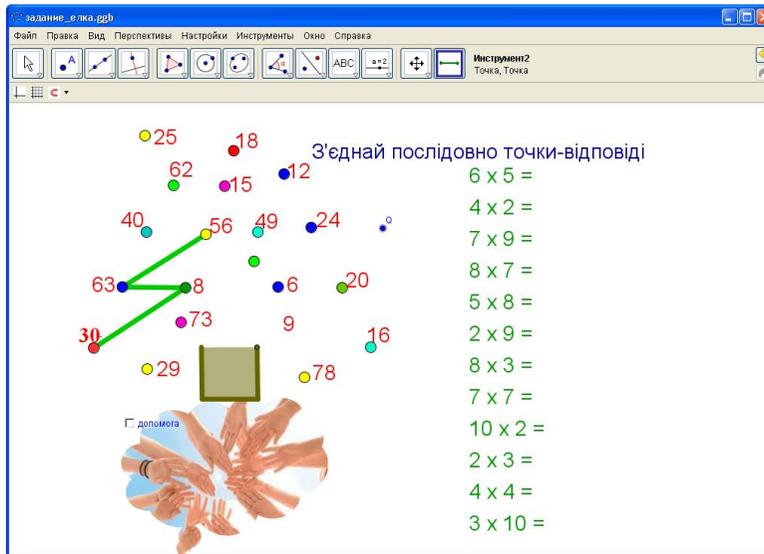


Fig 4. Children solve arithmetic tasks and connect in series points-answers. As a result, children get a Christmas tree.

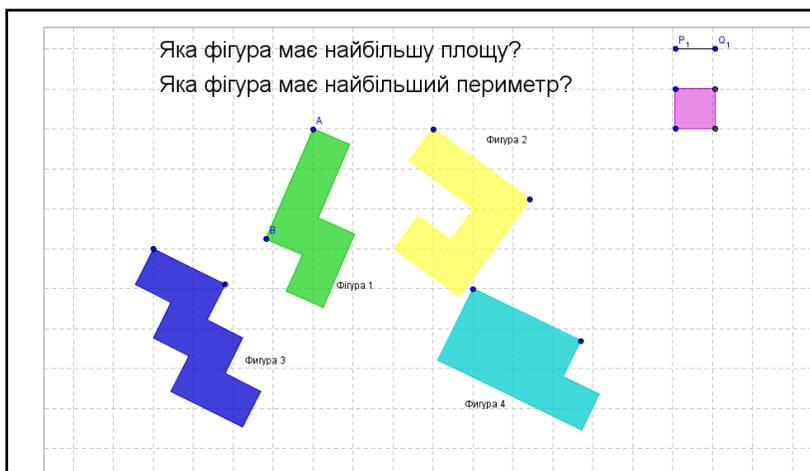


Fig 5. Model for task about square and perimeter of shapes. Children determined, which of the shapes has the largest square and the largest perimeter.

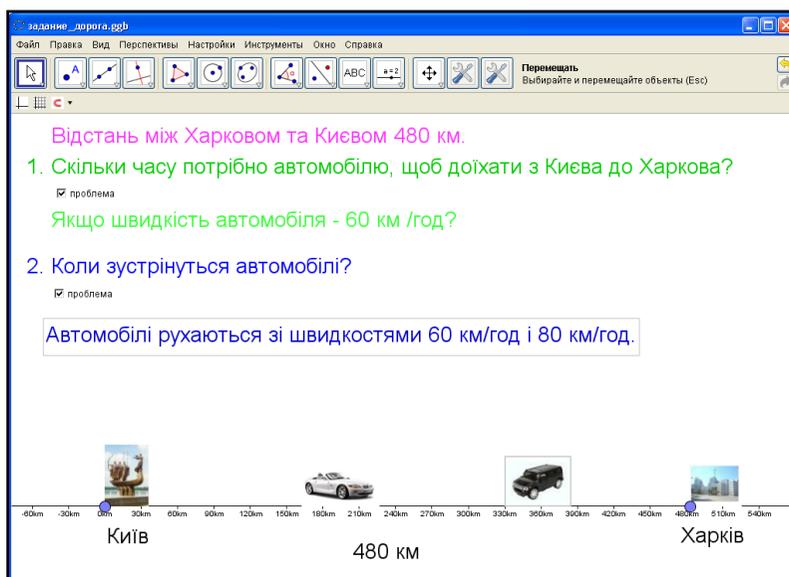


Fig 6. Model for task «Find time for a car to reach Kharkiv. Find time for cars to meet». Task has missing information. Pupils determines what they need and then can solve a task.