Chkana Ya., Stotskiy I. Modern visualization technologies in the training of future mathematics teachers: the role of mind maps.

Summary. *The article explores the role of the cognitive-visual approach in the preparation of future mathematics teachers, particularly the use of mind maps as an effective tool for knowledge structuring and the development of systemic thinking. Scientific and pedagogical approaches to the implementation of visualization methods in the educational process and their impact on the quality of learning mathematics are analyzed.*

It is shown that the use of mind maps contributes to the formation of logical connections between mathematical concepts, the development of critical thinking, and the enhancement of student motivation. The possibilities of using specialized software for creating and editing mind maps, as well as its role in activating students' cognitive activity, are explored. The significance of integrating mind maps into various forms of educational interaction, including group and individual classes, distance learning, and independent work, is emphasized.

A SWOT analysis of the use of mind maps in the professional training of teachers is conducted. The main advantages of this technology are identified, including the visualization of information, fostering the development of cognitive skills, and the ability to integrate with digital learning tools. At the same time, the key challenges of their application are outlined: the need for methodological support, adaptation of technologies to the content of mathematics education, and the development of students' digital competence for effective work with the corresponding software.

The prospects for further research include the development of methodological recommendations for the effective implementation of mind maps in the teaching of mathematics, evaluating their impact on students' learning outcomes, and integrating other modern visualization technologies to improve the quality of mathematics education.

Keywords: *mind maps, cognitive-visual approach, future mathematics teachers, digital competence, pedagogical technologies, knowledge visualization, critical thinking.*

UDC 378.147:51+371.385+372.851
DOI 10.24139/2519-2361/2025.01/130-138

K. Niedialkova
ORCID ID 0000-0003-1092-2116
South Ukrainian National Pedagogical University
named after K. D. Ushynsky (Odesa)

FUTURE MATHEMATICS TEACHERS' TRAINING TO USE NEW EDUCATIONAL TECHNOLOGIES

У статті представлено авторську методичну розробку з формування у майбутніх учителів математики вмінь застосовувати одну з нових педагогічних технологій – Скаффолдингу – на уроках математики, зокрема у профільних класах закладів загальної середньої освіти. Передусім, автор звертає увагу читача на сутність цієї технології та доцільність її використання на уроках математики. Відтак, актуальною стає проблема підготовки майбутніх учителів математики до реалізації зазначеної освітньої технології, дотримання основних принципів її застосування, формування вмінь студентів адекватно добирати систему математичних задач, зокрема задач з планіметрії, для досягнення поставленої мети. Автором докладно представлено послідовність реалізації усіх етапів технології Скаффолдингу на прикладі навчання школярів застосування методу введення допоміжного параметру під час розв'язування планіметричних задач підвищеного рівня складності. Продемонстровано, які проблемні питання слід обговорити зі здобувачами вищої педагогічної освіти задля розуміння ними сутності технології Скаффолдингу та умінь ефективно її застосовувати. Подана методична розробка зазнала апробацію на відкритому практичному занятті з курсу «Методика навчання математики» для студентів спеціальності «учитель математики та англійської мови» (заняття з курсу для цих здобувачів *проводяться англійською мовою). Реалізація методичної розробки зазнала схвальних відгуків колег по кафедрі математики і методики її навчання, а також позитивних відзивів від студентів, які відзначили корисність проведеної роботи для професійного становлення.*

***Ключові слова**: технологія Скаффолдингу, метод уведення допоміжного параметру, планіметрична задача, підготовка вчителя, методична компетентність учителя математики.*

Problem statement. Training of future mathematics teachers in pedagogical university for using new educational technologies - in a broad sense - is one of the main tasks of the disciplines of the psychological and pedagogical cycle, in particular the course "Methodics of Teaching Mathematics". One example of a modern, promising technology that it is advisable to introduce to future mathematics teachers and develop skills in its use is Scaffolding technology. It is worth considering the use of any educational technology in the context of solving problems of the advanced level, including various ways of solving, demonstrating the use of some general method for solving mathematical problems, etc. This is precisely what we see as the formation of mathematical and methodological competence of applicants for higher pedagogical education.

Analysis of current researches. Recently, educators have been paying more and more attention to Scaffolding technology, which can be applied in educational environments of various directions and levels. That is, Scaffolding technology is considered as a universal approach to the implementation of the educational process. The term “scaffolding” refers to the process in which a student solves a task with the support of a teacher or another more experienced person. In this case, the task is so complex that the student will definitely not be able to cope with it alone, but with the support of the teacher, he will be able to do it. It is such supports that best reflect the metaphor of “scaffolding” in learning. Without them, the arch will not hold until it is completely finished. This support is referred to as the metaphor of “scaffolding”.

The theory of Scaffolding technology in learning was first formulated in 1976 by American psychologists J. Bruner, D. Wood, and G. Ross [12]. Later, principles and criteria for the application of this technology were formulated. Nowadays, Scaffolding technology is implemented in teaching foreign languages [10], in implementing inclusive education [8], and in mathematics education [11]. Colleagues O. Zadorina, V. Motorina, I. Mitelman, and O. Papach explored the problem of applying Scaffolding technology in solving geometric problems of increased complexity [3]. Developing this idea, the author became interested in the problem of teaching schoolchildren the auxiliary parameter method using the Scaffolding technology.

It should be noted that in the current curriculum for advanced mathematics in grades 8-9 of general education institutions in Ukraine [9] the state requirements do not specifically state the need for students to master the method of introducing an auxiliary parameter (unlike, for example, the area method). In the current Ukrainian textbooks for grades 8-9, including geometry textbooks for advanced mathematics [1; 2; 6; 7], we also do not observe any targeted work on mastering the specified method (there are no demonstration examples and problems in the theoretical parts of these textbooks). Analyzing the current mathematics curricula for grades 10-11 of general education institutions in Ukraine (profile and advanced levels) [9] and geometry textbooks for grade 10 (profile and advanced levels) [4; 5], we can come to the similar conclusion.

The made remarks determine the relevance of the problem. In addition, the question arises of training future mathematics teachers both in the application of the pedagogical technology of Scaffolding as one of the universal and promising ones, and in teaching pupils special methods of solving problems.

The objectives of this research is to demonstrate the methodology for future mathematics teachers’ training the application of Scaffolding technology by the example of using the auxiliary parameter method when solving planimetric problems.

Presentation of the main material. Experimental work on teaching students how to use Scaffolding technology by the example of using the auxiliary parameter method when solving planimetric problems was performed with students majoring in "mathematics and English teacher", for whom the course "Methodics of Teaching Mathematics" is taught in English. First of all, it is necessary to familiarize students with the essence of Scaffolding technology (Fig. 1).

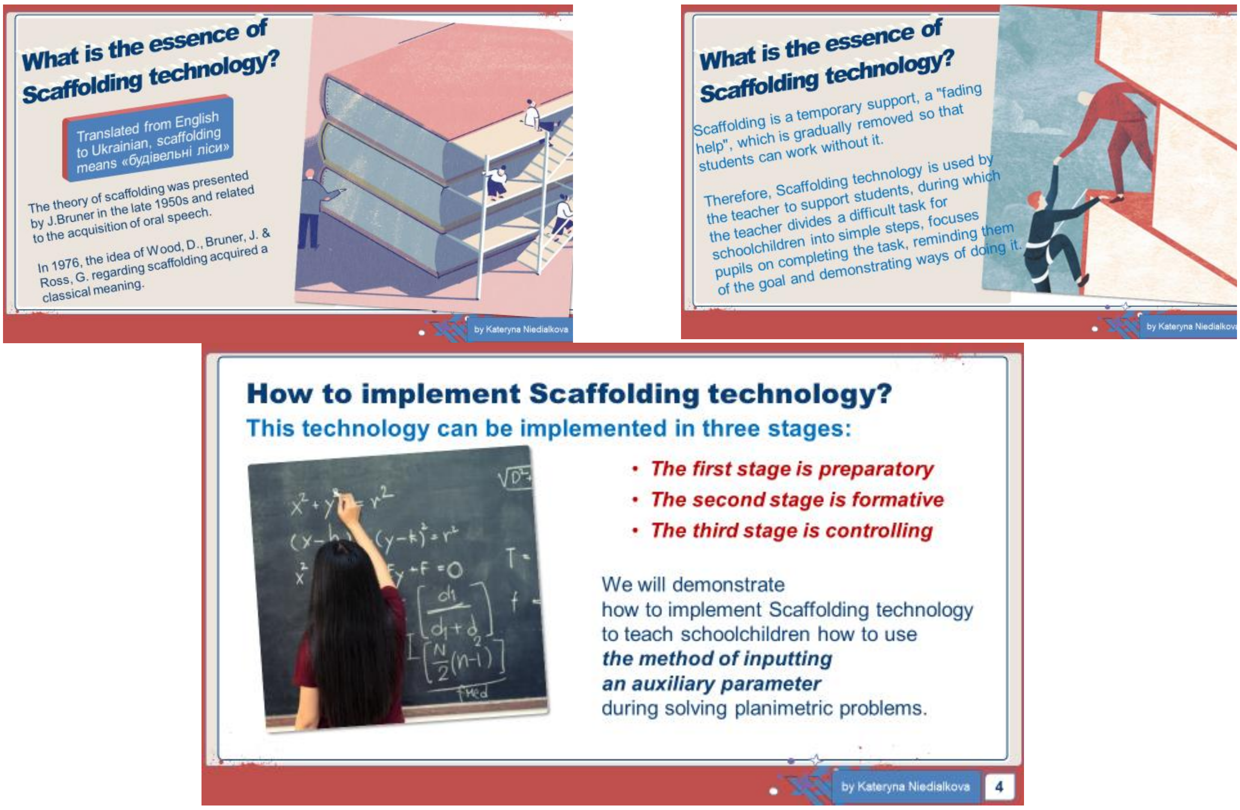


Figure 1. Familiarizing students with the essence of Scaffolding technology

Next, you can move on to implementing Scaffolding technology.

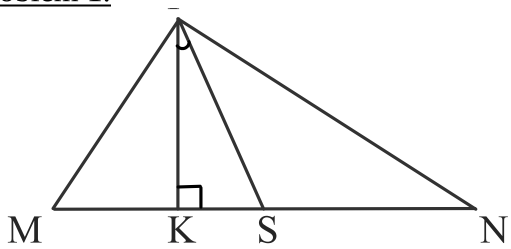
The first stage (preparatory).

I. 1. *Actualization of supporting knowledge (according to Scaffolding technology – reliance on formed knowledge, skills and abilities*).

We discuss with students that when working on the method of inputting an auxiliary parameter, the following can serve as an update of supporting knowledge and skills: activation of the algorithm for reducing fractions, theoretical information on trigonometric functions, formulas for finding perimeters, areas and volumes of figures, etc.

I. 2. *Acquaintance with the essence of the method of inputting an auxiliary parameter (according to Scaffolding technology - demonstration of a solution example, model, sample, etc.).*

Problem 1.



In right triangle MPN, height and median are drawn from vertex of right angle P. Angle β between them is equal to $\arccos\frac{40}{41}$.

Find ratio of the legs.

The problem 1 solution

In accordance with the condition of the problem $\cos\beta = \frac{40}{41}$, or $\frac{PK}{PS} = \frac{40}{41}$.

Let be $PK=h$, then $PS = \frac{41}{40}h$, $KS = \sqrt{PS^2 - PK^2} = \frac{9}{40}h$. Using the property of right triangle: $MS=PS=NS=\frac{41}{40}h$. Then $MK = MS - KS = \frac{4}{5}h$; $NK = NS + KS = \frac{5}{4}h$;

$MP = \sqrt{MK^2 + PK^2} = \sqrt{\frac{16}{25}h^2 + h^2} = \frac{h}{5}\sqrt{41}$;$NP = \sqrt{NK^2 + PK^2} = \sqrt{\frac{25}{16}h^2 + h^2} = \frac{h}{4}\sqrt{41}$. So, $\frac{MP}{NP} = \frac{h\sqrt{41}}{5} : \frac{h\sqrt{41}}{4} = \frac{4}{5}$.

The answer is 4 : 5.

After solving a teacher should give pupils some comments (Fig. 2).

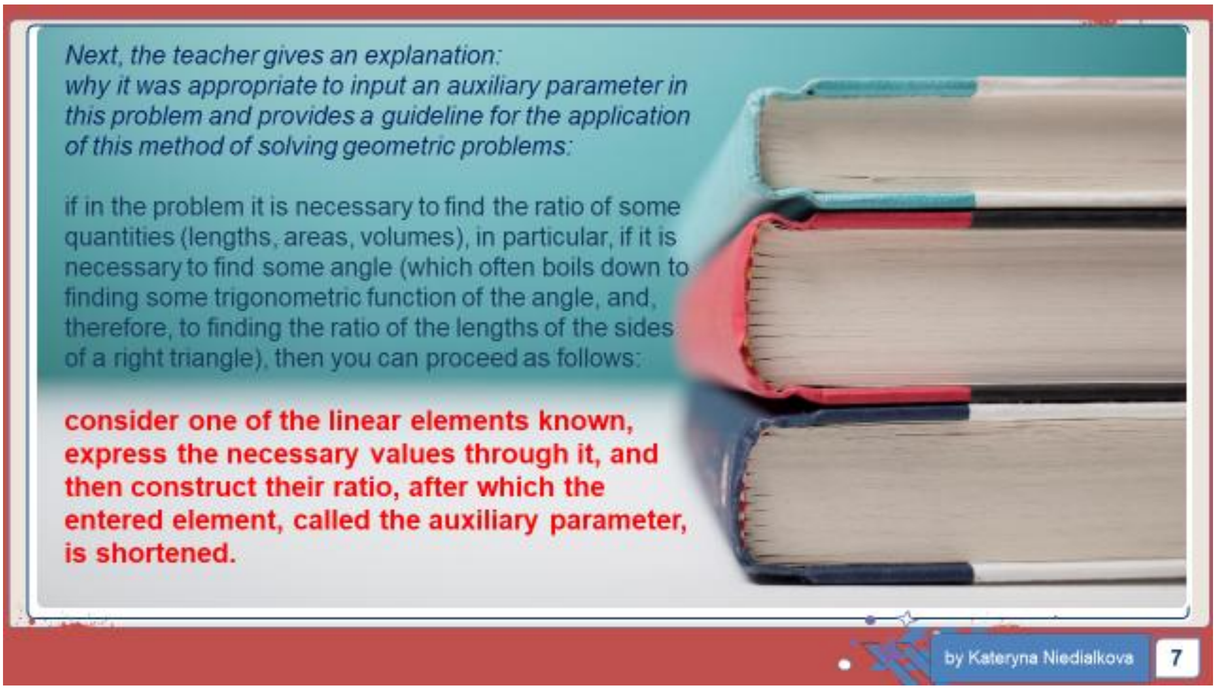
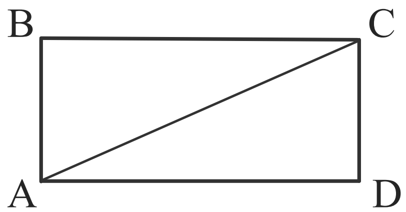


Figure 2. Teacher's comments for using the method of putting an auxiliary parameter

I. 3. *Mastering the method.*
<u>Problem 2.</u>



The diagonal of a rectangle divides its angle in ratio m : n.

Find ratio of perimeter of the rectangle to its diagonal.

It is necessary to discuss with future teachers of mathematics the methodics of working on the problem: first of all, we suggest that pupils express ideas for solving this problem (*according to Scaffolding technology - we suggest predicting the further development of events in the context of what they have heard and perceived*). Next, we ask pupils to justify why it is advisable to use the method of inputting an auxiliary parameter to solve this problem and suggest which linear element should be considered as known (*according to Scaffolding technology - leading questions, hints, directing the flow of thoughts*). Next is a joint work of schoolchildren and a teacher (with teacher's comments).

<u>The problem 2 solution</u>

Given the circumstances ABCD is a rectangle and $\angle BAC : \angle DAC = m : n$. If α is a coefficient of proportion, then $m\alpha + n\alpha = 90^{\circ}$ and $\alpha = \frac{90^{\circ}}{m+n}$. It is necessary to find the ratio $\frac{P_{ABCD}}{AC}$. Let be *AB*=*p*. From right triangle ABC we have: $BC = p \cdot tg\ m\alpha$.

So, $P_{ABCD} = 2(p + p \cdot tg\ m\alpha) = 2p(1 + tg\ m\alpha)$.

$$AC = \sqrt{AB^2 + BC^2} = \sqrt{p^2 + p^2 tg^2 m\alpha} = \sqrt{p^2(1 + tg^2 m\alpha)} = \left|\frac{p}{\cos m\alpha}\right| = \frac{p}{\cos m\alpha}.$$

$$\frac{P_{ABCD}}{AC} = \frac{2p(1 + tg\ m\alpha) \cdot \cos m\alpha}{p} = \frac{2\cos m\alpha(\sin m\alpha + \cos m\alpha)}{\cos m\alpha} =$$

$$= 2\sqrt{2}\left(\frac{1}{\sqrt{2}}\sin m\alpha + \frac{1}{\sqrt{2}}\cos m\alpha\right) = 2\sqrt{2}\cos(45^{\circ} - m\alpha) =$$

$$= 2\sqrt{2}\cos\left(45^{\circ} - m \cdot \frac{90^{\circ}}{m+n}\right) = 2\sqrt{2}cos\frac{45^{\circ}(n-m)}{m+n}.$$

The answer is $2\sqrt{2}\cos\frac{45^\circ(n-m)}{m+n}$.

At the end of working with this problem, together with the pupils, we derive an algorithm for applying the method of inputting an auxiliary parameter *(according to Scaffolding technology - providing clear instructions, determining the set of skills necessary to solve the given problem):*

1*) c*hoose a linear element that we will consider known (auxiliary parameter), mark it with a letter;

2) express other necessary quantities through it;

3) make an appropriate ratio; if necessary, simplify a resulting expression;

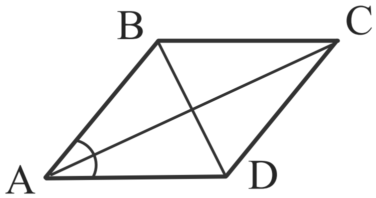
4) shorten an auxiliary parameter;

5) form an answer to the problem.

The second stage (formative).

II. 1. *Considering the problem.*

Problem 3.



Define an acute angle of a rhombus in which a side is geometric mean of its diagonals.

The first step is to discuss with future teachers of mathematics the methodics of working on the problem:

- we suggest that pupils determine, firstly, why it is possible to try to solve this problem by the method of inputting an auxiliary parameter, and, secondly, which linear element should be chosen as an auxiliary parameter.
- we emphasize to schoolchildren that this is a defining stage of application of this method (*according to Scaffolding technology - we emphasize the important, we find "system-forming" moments that determine the success of further actions*).
- we give pupils time to think and discuss their ideas. We conclude that a side of the rhombus will act as an auxiliary parameter.
- further, using the defined algorithm of application of the method, we give schoolchildren the opportunity to solve the problem at their own pace, while the teacher provides individual help to everyone who needs it.

The problem 3 solution

In accordance with the condition of the problem $AB^2 = AC \cdot BD$.

Let be *AB*=*a*. Then from the triangle *ABC* we have:

$AC^2 = 2a^2 - 2a^2\cos(180^\circ - \alpha) = 2a^2(1 + \cos\alpha) = 4a^2cos^2\frac{\alpha}{2}$, where $\alpha = \angle A$ (by the cosine theorem). From the triangle *ABD* we have:

$BD^2 = 2a^2 - 2a^2\cos\alpha = 2a^2(1 - \cos\alpha) = 4a^2sin\frac{\alpha}{2}$ (by the cosine theorem).

Given the circumstances $2a\sin\frac{\alpha}{2} \cdot 2a\cos\frac{\alpha}{2} = a^2$; $2\sin\frac{\alpha}{2}\cos\frac{\alpha}{2} = \frac{a^2}{2a^2}$;

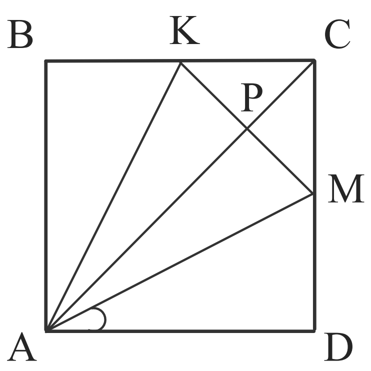
$\sin\alpha = \frac{1}{2}$; $\alpha = 30^\circ$ (based on the fact that ∠A is an acute angle of a rhombus).

The answer is 30°.

It is possible to offer pupils as a homework to find other way to solve this problem, without using the method of inputting an auxiliary parameter, using the teacher's hint (using the condition of the problem and some property of diagonals of a parallelogram, solve the problem algebraically, obtaining a trigonometric equation). At the next stage of work with this problem, a comparative analysis of solution methods from the point of view of rationality will be conducted.

II. 2. *Solving the problem.*

Problem 4.



An isosceles triangle is inscribed in square ABCD so that point K lies on the side BC, point M is on side CD, and AM=AK.

Find angle MAD if it is known that tan∠AKM=3.

It is necessary to discuss with future teachers of mathematics the methodics of working on the problem: students of the class are divided into two groups. The first group is offered to solve the problem using the method of inputting an auxiliary parameter, the second group - in a different way, without using this method. *At this stage of working with Scaffolding technology, its essence is manifested in mutual support, mutual advice from classmates (due to group work), but not from the teacher - "fading" support.*

<u>The problem 4 solution</u>

<u>The first way</u>

We prove that ∠MAD=∠KAB; KP=CP; triangle AKP is right-angled. By the condition tan∠AKM=3, therefore $\frac{AP}{KP} = 3$. Let be KP=*x*, then AP=3*x*, and AC=4*x*. So, $AB = 2\sqrt{2}x$, and $AK = \sqrt{10}x$. Therefore, $\cos\angle KAB = cos\angle MAD = \frac{AB}{AK} = \frac{2\sqrt{2}x}{\sqrt{10}x} = \frac{2\sqrt{5}}{5}$. That is why $\angle MAD =$ arccos$\frac{2\sqrt{5}}{5}$.

<u>The answer is</u> arccos$\frac{2\sqrt{5}}{5}$.

<u>The second way</u>

We prove that ∠AKP=∠AMP; triangle *AMP* is right-angled.

∠MAD=$45^\circ - \angle PAM = 45^\circ - (90^\circ - \angle AMP) = \angle AMP - 45^\circ = \angle AKP - 45^\circ$.

Then $tan\angle MAD = tan\,(\angle AKP - 45^\circ) = \frac{tan\angle AKP - tan45^\circ}{1 + tan\angle AKP \cdot tan45^\circ} = \frac{3-1}{1+3} = \frac{1}{2}$.

Отже, $\angle MAD = arctan\frac{1}{2}$.

<u>The answer is</u> $arctan\frac{1}{2}$.

Further work with schoolchildren on this problem consists in:

1) presentations by each group of their methods of solving the problem;

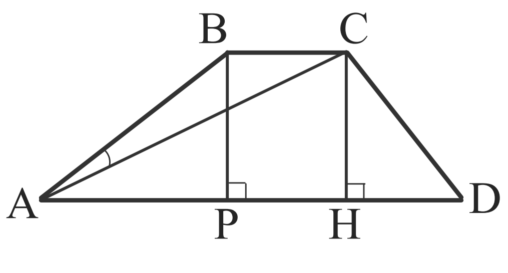
2) proving the fact that arccos (2√5)/5=arctan 1/2 (collective work of the class);

3) comparison of two ways of solving this problem in terms of rationality.

The third stage (controlling).

III. 1. *Solving the problem.*

<u>Problem 5.</u>



The angle at vertex A of trapezoid ABCD is equal to α, and side AB is twice as large as its smaller base BC.

Find angle BAC.

The methodics of work with schoolchildren on this problem is following: it is assumed that pupils will independently solve this problem, with the following mutual verification. *Adhering to Scaffolding technology, at this stage, as "fading" support, the teacher provides the correct answer* *to the problem at the beginning of its solution by schoolchildren.* After pupils have checked each other, the correct solution to this problem is demonstrated by a teacher on a slide (screen, board).

The problem 5 solution

The first way

Given the circumstances, $\angle A = \alpha$. Let be $BC=k$, then $AB=2k$. $\angle BAC = \alpha - \angle CAD$. $tan\angle CAD = tan\angle CAP = \frac{CP}{AP}$ (from triangle ACP).

From triangle ABH we have: $BH = 2k\sin\alpha = CP$; $AH = 2k\cos\alpha$; $AP = k + 2k\cos\alpha$.

So, $tan\angle CAD = \frac{2k\sin\alpha}{k(2\cos\alpha+1)} = \frac{2\sin\alpha}{2\cos\alpha+1}$; $\angle CAD = arctan\frac{2\sin\alpha}{2\cos\alpha+1}$.

That is why $\angle BAC = \alpha - arctan\frac{2\sin\alpha}{2\cos\alpha+1}$.

Let us give the answer in the laconic form; it needs to consider $tan\angle BAC$.

$$tan\angle BAC = tan\left(\alpha - arctan\frac{2\sin\alpha}{2\cos\alpha+1}\right) = \frac{tan\alpha - \frac{2\sin\alpha}{2\cos\alpha+1}}{1 + tan\alpha\cdot\frac{2\sin\alpha}{2\cos\alpha+1}} =$$

$$= \frac{\frac{\sin\alpha}{\cos\alpha} - \frac{2\sin\alpha}{2\cos\alpha+1}}{1 + \frac{\sin\alpha}{\cos\alpha}\cdot\frac{2\sin\alpha}{2\cos\alpha+1}} = \frac{2\sin\alpha\cos\alpha + \sin\alpha - 2\sin\alpha\cos\alpha}{2cos^2\alpha + \cos\alpha + 2sin^2\alpha} = \frac{\sin\alpha}{2+\cos\alpha}.$$

So, $\angle BAC = arctan\frac{\sin\alpha}{2+\cos\alpha}$.

The answer is $arctan\frac{\sin\alpha}{2+\cos\alpha}$.

It should be noted that giving students the correct answer to this problem at the beginning of the solution directs the course of thought to finding the tangent of ∠CAD. Although the solution can be presented in another way, namely:

from triangle ABC using the cosine theorem we have:

$AC^2 = k^2 + 4k^2 - 2\cdot k\cdot 2k\cdot\cos(180^\circ - \alpha) = 5k^2 + 4k^2\cos\alpha$.

So, $AC = k\sqrt{5+4\cos\alpha}$ (since k is a positive quantity).

From triangle ABP we have: $BP = 2k\sin\alpha = CH$. From triangle CAH we have: $\sin\angle CAH = \frac{CH}{AC} = \frac{2k\sin\alpha}{k\sqrt{5+4\cos\alpha}} = \frac{2\sin\alpha}{\sqrt{5+4\cos\alpha}}$; so, $\angle CAH = \arcsin\frac{2\sin\alpha}{\sqrt{5+4\cos\alpha}}$.

Therefore $\angle BAC = \alpha - \arcsin\frac{2\sin\alpha}{\sqrt{5+4\cos\alpha}}$.

The answer is $\alpha - \arcsin\frac{2\sin\alpha}{\sqrt{5+4\cos\alpha}}$

III. 2. *The control work.*

Problem 6.

A trapezoid with acute angles α and β is described around a circle. Find the ratio of perimeter of the trapezoid to the length of the circle.

This stage of teaching schoolchildren the method of inputting an auxiliary parameter using Scaffolding technology involves pupils solving the problem on their own with following check by a teacher (with evaluation).

If desired, a teacher can offer not one, but several tasks for applying the method of inputting an auxiliary parameter to evaluate the effectiveness of mastering this method by schoolchildren.

Conclusions and prospects. At the end of such a lesson from the course "Methods of Teaching Mathematics", it is necessary to focus the attention of future mathematics teachers on the following: when pupils work out the method of inputting an auxiliary parameter in this way, ***the main principles of Scaffolding technology*** are observed:

1) *immutability of the assigned task* (in this case, mastering the specified method of solving geometric problems) and
2) *change in amount of support for schoolchildren from maximum to minimum*, with the subsequent transition to independent problem solving by pupils.

It is also important to discuss with future teachers of mathematics when, at what stage of studying the school mathematics course, it is appropriate to propose schoolchildren such the sequence of the problems, created in the context of the realization of Scaffolding technology, and for classes of what the mathematical learning level it can be offered. Talking about it, students mostly marked the following: it is advisable to conduct targeted work on mastering the method of inputting an auxiliary parameter by schoolchildren of profiled classes at the end of grade 10 (as part of systematization and generalization), the goals of which are: 1) practicing the method of solving problems; 2) using the trigonometry apparatus when solving problems (which is relevant given the content of the algebra and beginnings of analysis course in grade 10 and provides intra-subject connections of mathematics as an educational subject in a general education school); 3) preparation for effective solving of problems in the geometry course in grade 11 (for finding the ratios of surface areas and volumes of geometric bodies).

The presented methodical creation was tested at an open practical lesson on the course "Methodology of Teaching Mathematics" for students of the specialty "Teacher of mathematics and English" (course classes for these applicants are conducted in English). The implementation of the methodical creation received favorable reviews from colleagues in the Department of Mathematics and Methods of Teaching Mathematics, as well as positive feedback from students who noted the usefulness of the work carried out for professional development.

We see the prospect of further research in this direction in the development of other topics of the school mathematics course in the context of the application of Scaffolding Technology, determining the effectiveness of its use; as well as in training future mathematics teachers in other promising educational technologies.

REFERENCES

1. Yershova, A. P., Holoborodko, V. V., Kryzhanovsky, O. F., Yershov, S. V. (2016) Geometry: textbook for 8th grade general education. textbook. Kharkov : Publishing house "Ranok".
2. Yershova, A. P., Holoborodko, V. V., Kryzhanovsky, O. F., Yershov, S. V. (2017) Geometry: textbook for 9th grade general education. textbook. Kharkov : Publishing house "Ranok".
3. Zadorina, O. M., Mitelman, I. M., Motorina, V. G., Papach, O. I. (2024) Scaffolding as a tool for advanced learning of solving complex geometric problems using the coordinate method and its didactic and methodological support. Innovative Pedagogy: Scientific Journal. Black Sea Research Institute of Economics and Innovation, 74, 33-46. Retrieved from: http://www.innovpedagogy.od.ua/archives/2024/74/7.pdf
4. Merzlyak, A. G., Nomirovskyi, D. A., Polonskyi, V. B., Yakir, M. S. (2018) Geometry: beginning of study at an advanced level from grade 8, professional level: textbook for grade 10 of general secondary education institutions. Kharkiv : Gymnasium.
5. Merzlyak, A. G., Nomirovskyi, D. A., Polonskyi, V. B., Yakir, M. S. (2019) Geometry: beginning of study at an advanced level from grade 8, professional level: textbook for grade 11 of general secondary education institutions. Kharkiv : Gymnasium.
6. Merzlyak, A. G., Polonskyi, V. B., Yakir, M. S. (2016) Geometry for general educational institutions with in-depth study of mathematics: textbook for 8th grade general educational institutions. Kharkiv: Gymnasium.
7. Merzlyak, A. G., Polonskyi, V. B., Yakir, M. S. (2017) Geometry for general educational institutions with in-depth study of mathematics: textbook for 9th grade general educational institutions. Kharkiv: Gymnasium.
8. Pavlyukh, V. V. Scaffolding as a strategy for supporting students with special educational needs in inclusion. Retrieved from: https://znayshov.com/FR/23604/nmv_59-163-168.pdf
9. List of educational literature and curricula recommended by the Ministry of Education and Science of Ukraine for the 2024-25 academic year. Retrieved from: https://salo.li/04A0e76.
10. Fidkevych, O., Snegireva, V. (2023) Scaffolding in the system of multilingual education methods. Ukrainian Pedagogical Journal, 2, 107–114. https:// doi.org/10.32405/2411-1317-2023-2-107-114.

11. Anghileri, J. (2006) Scaffolding practices that enhance mathematics learning. Journal of Mathematics Teacher Education,. Vol. 9. № 1, 33–52. https://doi. org/10.1007/s10857-006-9005-9
12. Wood, D., Bruner, J., Ross, G. (1976) The Role of Tutoring in Problem Solving. Journal of Child Psychology and Psychiatry and Allied Disciplines, 17, 89–100. https://doi.org/10.1111/j.1469-7610.1976. tb00381.x

K. Niedialkova. Future mathematics teachers' training to use new educational technologies.

Summary. *The article presents the author's methodical creation on the formation of students – future mathematics teachers' skills to apply one of the new pedagogical technologies - Scaffolding technology in mathematics lessons, in particular in profiled classes of secondary education institutions. First of all, the author draws the reader's attention to the essence of this technology and the feasibility of its use in mathematics lessons. Therefore, the problem of preparing future mathematics teachers for the implementation of this educational technology, adherence to the basic principles of its application, and forming students' skills to adequately select a system of mathematical problems to achieve the set goal becomes relevant. The author presents in detail the sequence of implementation of all stages of the Scaffolding technology on the example of teaching schoolchildren to use the method of inputting an auxiliary parameter when solving planimetric problems of a high level of complexity. It is demonstrated what problematic issues should be discussed with applicants for higher pedagogical education in order for them to understand the essence of the Scaffolding technology and the skills to effectively apply it. The presented methodical creation was tested at an open practical lesson on the course "Methodology of Teaching Mathematics" for students of the specialty "teacher of mathematics and English" (course lessons for these applicants are conducted in English). The implementation of the methodical development received favorable reviews from colleagues in the Department of Mathematics and Methods of Teaching Mathematics, as well as positive feedback from students who noted the usefulness of the work carried out for professional development.*

Keywords*: Scaffolding technology, method of inputting an auxiliary parameter, planimetric problem, training of a teacher, methodical competence of a mathematics teacher.*

УДК 378
DOI 10.24139/2519-2361/2025.01/138-146

Н. В. Кугай
ORCID ID 0000-0002-9193-1956
Глухівський національний педагогічний
університет імені Олександра Довженка

ПОРІВНЯЛЬНИЙ АНАЛІЗ ПРАКТИЧНОЇ ПІДГОТОВКИ МАЙБУТНІХ УЧИТЕЛІВ МАТЕМАТИКИ В УКРАЇНІ ТА РЕСПУБЛІЦІ ПОЛЬЩА: КІЛЬКІСНИЙ ТА ЯКІСНИЙ ВИМІР

У статті проведено порівняльний аналіз практичної підготовки майбутніх учителів математики в педагогічних університетах України та Республіки Польща. Досліджено структуру та обсяг практичної підготовки в педагогічних університетах України (Глухівський національний педагогічний університет імені Олександра Довженка, Дрогобицький державний педагогічний університет імені Івана Франка, Уманський державний педагогічний університет імені Павла Тичини) та Республіки Польща (Педагогічний університет імені Комісії національної освіти у Кракові). Встановлено, що в обох країнах підготовка майбутніх учителів математики здійснюється за дворівневою системою (бакалаврат і магістратура), але існують відмінності в тривалості навчання та обсязі кредитів ЄКТС. В українських університетах загальний обсяг кредитів, відведених на практику, дещо більший, ніж у польському університеті, що свідчить про