

E-learning

Vol. 10

E-learning and Smart Learning Environment for the Preparation of New Generation Specialists

Scientific Editor
Eugenia Smyrnova-Trybulska



Katowice – Cieszyn 2018

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**E-learning and Smart Learning
Environment for the Preparation
of New Generation Specialists**

University of Silesia in Katowice,
Faculty of Ethnology and Sciences
of Education in Cieszyn

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Monograph

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Eugenia Smyrnova-Trybulska

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THE CONSTRUCTOR OF MULTIMEDIA LECTURE PRESENTATIONS AS A MEANS OF STUDYING THE DISCIPLINE "METHODOLOGY OF TEACHING MATHEMATICS AT PRIMARY SCHOOL"

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***Abstract:** As a result of the confirmatory experiment, the necessity to use multimedia lecture presentations by the teachers of the discipline "Methodology of Teaching Mathematics at Primary School" was recognized. The analysis of the normative discipline programmes of 12 universities of Ukraine has shown differences both in the structure and content of the educational material. In view of this, the constructor of multimedia lecture presentations, its structure and content was developed. For the practical use of the construction of presentations with the aim of preparing lectures, methodological recommendations for teachers were developed. The implementation of the constructor into the educational process of the pedagogical faculties of 3 universities in Ukraine has shown increasing effectiveness of training future primary school teachers in teaching mathematics.*

Keywords: teacher training, primary school, methodology of teaching mathematics, lecture, multimedia presentation.

INTRODUCTION

The training of future primary school teachers in teaching mathematics to pupils takes place within the framework of the course "Methodology of Teaching Mathematics at Primary School". Taking into account the modern approaches and technologies of teaching primary school pupils, the specificity of giving lectures on this discipline requires demonstration and a wide use of a variety of teaching aids, including subject and schematics, textbooks, manuals, lesson study aids, normative documents regulating the process of teaching mathematics at primary school, video fragments of real mathematics lessons, etc.

The results of a survey of twenty teachers of the methodology of teaching mathematics (University of Odesa (Odesa), Kherson State University, Berdiansk

State Pedagogical University, Vasyl Sukhomlynsky Mykolaiv National University, Vasyl Stefanyk Precarpathian National University, Taras Shevchenko Chernihiv National Pedagogical University, Ivan Franko Lviv National University, Bohdan Khmelnytsky Cherkasy National University, Pavlo Tychyna Uman National Pedagogical University, Mykhailo Drahomanov National Pedagogical University (Kyiv), Anton Makarenko Sumy State Pedagogical University, Oleksandr Dovzhenko Hlukhiv National Pedagogical University, Bohdan Khmelnytsky Humanities and Pedagogical Academy, Lviv, Zaporizhzhia, Cherkasy regional institutes of postgraduate pedagogical education, Kherson Academy of Continuing Education and Odesa Institute of Teachers' Training) conducted within the confirmatory experiment showed that all the teachers who participated in the survey (100% of respondents) believe that an increasing quality of the results of the students' grasp of the methodology of teaching mathematics can be achieved through the teaching means, created on the basis of information technologies. Besides, most teachers (95%) are confident about the relevance of using information technologies, precisely during lectures. That is why all interviewed teachers expressed the need to use multimedia lecture presentations on the methodology of teaching mathematics. However, not all teachers have the skills and experience in creating presentations, so only 20% of the respondents confirmed that they always use them during lectures.

So, as a result of the confirmatory experiment, we confirmed the relevance of the development of multimedia lecture presentations, in which the educational content is presented in the structured form; methodological approaches are illustrated with colours and animation effects; the methods of work on certain mathematical problems are given by means of dynamic deployment of the solution; the natural visuality is replaced with electronic and the methods of working with it are demonstrated with the animation effects; hyperlinks to electronic versions of normative documents and mathematics textbooks for primary school are placed, links to the video fragments of real mathematics lessons at primary school, demonstrating an appropriate element of the educational content (structure of a lesson, teaching technology, etc.), as well as video fragments with students' thinking, demonstrating ways of calculating, work on tasks, etc.

Also, within the framework of the confirmatory experiment, a comparative analysis of the normative curriculum "Methodology of Teaching Mathematics" was done, approved at the M. Drahomanov National Pedagogical University; developers - V. Chaichenko, O. Kondratiuk; at the Kostiantyn Ushynsky South Ukrainian National Pedagogical University; developer - S. Skvortsova; at Berdiansk State Pedagogical University; developer - L. Koval; at the Taras Shevchenko Chernihiv National Pedagogical University; the developer - S. Strelets; at Kherson State University; developer - V. Tsys; at the Vasyl Stefanyk Precarpathian National University, developer - R. Romanishin; at the Bohdan Khmelnytsky Cherkasy National University; developer - T. Zorokhkina; at the Anton Makarenko Sumy State Pedagogical University; developer - O. Vasko; at Donbas State Pedagogical

University; developer - N. Liashova; at the Vasyl Sukhomlynsky Mykolaiv National University; developer - K. Avramenko; at the Oleksandr Dovzhenko Hlukhiv National Pedagogical University; developer - H. Nepomniashcha; at the Bohdan Khmelnytsky Humanities and Pedagogical Academy; developers - N. Kravchuk, T. Schuper. As a result of the analysis, there was a significant difference in the distribution of content and time for mastering particular questions of the course, significant differences between the number and distribution of hours for lectures, practical and laboratory classes at these universities (Skvortsova, 2015). Therefore, it is impossible to unify the process of training future primary school teachers in teaching mathematics to pupils through the creation of a unified system of lecture presentation on the methodology of teaching mathematics. In addition, according to the survey, most of the teachers (85%) prefer to use just slides for lecture presentation with animation, with the possibility of independent design of the lecture.

So, in our research, we have resorted to creating the constructor of lecture presentations, using which the teacher selects those slides which, from his point of view, will give him the opportunity to explain the topic, provided by the course programme. In addition, the teacher can make changes in the constructor of lecture presentations, taking into account the individual characteristics of students, creating conditions for satisfying cognitive needs.

1. THE CONSTRUCTOR OF LECTURE PRESENTATIONS ON THE EDUCATIONAL DISCIPLINE "METHODOLOGY OF TEACHING MATHEMATICS"

1.1 Structure and contents of the constructor of lecture presentations

The term *constructor of lecture presentations on the discipline "Methodology of Teaching Mathematics"* means the catalogue of files, structured according to the three thematic sections related to the specific content of the above mentioned educational discipline. Moreover, the content of each section is fully disclosed in the system of multimedia presentations on topics. Thus, the first section contains one topic: "Methodological system of teaching mathematics to primary school pupils". The content of this topic reveals the following issues:

1. Methodology of teaching mathematics as a science and as a school subject.
2. The purpose and tasks of teaching mathematics at primary school according to the new edition of the State standard of primary school (2018).
3. The contents of teaching mathematics at primary school. Typical educational programme for 1 to 2; 3 to 4 forms.
4. Methods and forms of teaching mathematics at primary school. Modern teaching technologies in teaching mathematics at primary school. The model of the lesson, constructed according to different educational technologies.

5. Means of teaching mathematics at primary school.

The second section also contains one topic: "Modern lesson of mathematics at primary school". The topic is presented in several issues:

1. Calendar-thematic planning of mathematics lessons.
2. Purpose and objectives of the mathematics lesson.
3. Structure of the combined mathematics lesson.
4. Motivation of educational and cognitive activity of pupils.
5. Actualization of reference knowledge and pupils' ways to act.
6. Familiarization with the new educational material and its mastering.
7. Repeating. Formation of skills and abilities.
8. Reflection of educational and cognitive activity of pupils at the lesson.

The third section is structured in six chapters, each containing several topics.

1. Methodology of actualization and systematization of mathematical representations of first-graders obtained at the pre-school period.
2. Methodology of teaching numbering and arithmetical actions on numbers in the course of primary mathematics. This unit provides studying a number of topics: "Methodology of teaching the numbering of the first ten"; "Methodology of formation of computing skills of addition and subtraction within 10"; "Methodology of teaching numbering of the first hundred"; "Methodology of forming computing skills of addition and subtraction within 100 without passing through the place"; "Methodology of forming computing skills of addition and subtraction within the limits of 20 with passing through the place"; "Methodology of forming computing skills of addition and subtraction within the limits of 100 with passing through the place"; "Methodology of computing skills of table multiplication and division"; "Methodology of studying the numbering of numbers in the concentrator "Thousand"; "Methodology of forming computing skills of addition and subtraction within 1000"; "Methodology of forming computational skills beyond table multiplication and division"; "Methodology of studying the numbering of multi-digit numbers"; "Methodology of forming computational skills in a concentrator" Multi-digit numbers"; "Methodology of forming the concept of parts of value"; "Methodology of forming the concept of fraction".

Moreover, each topic is shown through the system of issues: 1) the contents and results of studying the topic by the Typical educational programme; 2) visual training aids and didactic material; 3) the order of studying the subject by the current textbooks; 4) methodology of studying individual issues of the subject; 5) implementation of the content of the new curriculum in the current textbooks.

3. Methodology of teaching values and their measurement. This unit covers the topics: "Methodology of teaching the main values and their measurement: length,

weight, capacity; time", "Area of the figure". The first topic contains the following issues: 1) the values in the course of primary mathematics; 2) contents and results of studying; 3) methodology of learning particular issues of the programme: 1st grade; 2nd class; 3rd grade; 4th grade.

4. "Methodology of teaching mathematical expressions, equations and inequalities". The section deals with the topic: "Algebraic material in the course of primary mathematics". Its content reflects the following issues: 1) the content of the algebraic material of the primary course of mathematics; 2) mathematical expressions: numeric and alphanumeric; 3) numerical equality and inequality; the dependence of the result of the arithmetic action on the change of the component; 4) the equation; 5) solving tasks using equations; 6) inequality with a variable.

5. Methodology of solving story problems. This section represents the topics: "General questions of teaching methodology of solving mathematical story problems", "Methodology of forming skills for solving simple problems in the 1st grade"; "Methodology of forming skills of solving simple problems in 2nd grade"; "Methodology of acquaintance with the concept of "a completed task"; "Methodology of forming skills for solving simple problems in 3 and 4 grades"; "Methodology of forming skills for solving complex problems in 3 grade"; "Methodology of forming skills to solve problems, finding the 4th proportional"; "Methodology of forming skills to solve tasks on a double summary to one"; "Methodology of forming skills to solve tasks on proportional division", "Methodology of solving tasks to find unknown by two differences"; "Methodology of forming skills for solving tasks for joint work"; "Methodology of forming skills in solving problems in motion".

The content of each topic related to the methodology of forming skills for solving typical tasks, reveals a number of issues: 1) the contents and results of learning topics by the new program; 2) the contents and methodology of preparing work; 3) familiarization with a new kind of tasks; 4) formation of the ability to solve tasks.

6. Methodology of studying spatial relationships and geometric figures contains the topic: "Methodology of teaching elements of geometry in the course of primary school mathematics", which is revealed through the issues: 1) the content of the geometric material of the primary course of mathematics; 2) the order of studying elements of geometry at primary school; 3) the methodology of formation of geometrical representation and concepts: the formation of ideas about the point, line, line curve, segment and brake; formation of ideas about polygons and their elements; formation of ideas about the angle, types of angles; formation of the concept of a rectangle and a square; forming an idea of the circular disk and circle and their elements; geometric shapes in space.

Consequently, the content of each topic in a generalized form can be given as follows:

- contents and results of learning the subject according to the new programme;

- visual training aids and didactic material;
- the order of studying the subject by the current textbooks;
- methodology of studying individual issues of the topic;
- implementation of the content of the new curriculum in the current textbooks.

We included these elements in the presentation of the multimedia lecture on each topic. It should be noted, that in the construction of lecture presentations the content of these elements is also structured in a certain way, and provides the levels of lower order: on the first, the list of individual issues of the subject, each of which is disclosed at the next, lower level. For example, the methodology of studying certain issues of the subject involves the content and methodology of preparatory work, the methodology of familiarization (can be given in several variants) and the formation of pupils' concept, skills or abilities of a particular action.

At the same time, certain units have peculiarities. For example, the methodology of numbering numbers at different concentrators involves consideration of issues: the formation of a number; the order of placing numbers in a natural sequence; reading and writing a number; composition of the number; comparison of numbers; arithmetic operations with numbers based on numbering, etc.

Methodology of forming the computing skills of addition and subtraction involves clarifying the issues: the list of methods of calculation in a certain concentrator ("Ten", "Hundred", "Thousand", "Multi-digit numbers"), the order of their consideration; formation of a certain method of the calculation: the theoretical basis of the method; actions and operations from which the method consists; preparatory work for the introduction of computing; familiarization with the method of calculation; the formation of a computing skill, etc.

Methodology of solving tasks (simple tasks, complex tasks, typical tasks) is directed at: the consideration of theoretical foundations (mathematical structures of tasks and methods of their solving); preparatory work; familiarization with the task; formation of skills to solve tasks; studying the task after its solving, etc.

Thus, the constructor of lecture presentations on the educational discipline "Methodology of Teaching Mathematics" represents the clear hierarchical structure in which the level of the lower order is separate presentations that detail the content of the issues of the topic and can be used by teachers to create their own multimedia lecture presentations.

Each topic in the constructor of presentations is a separate multimedia presentation, built on a single problem lecture scheme, and the issues of the topic are represented through hyperlinks. The structure of the presentation on each topic contains the following mandatory slides: a slide with the title of the theme (Fig. 1), a slide with problematic questions (Fig. 2), a slide with the recommended literature (Fig. 3), a slide with the lecture plan, which contains hyperlinks to individual presentations

that reveal the content of each issue of the plan (Fig. 4), as well as the last slide summary and reflection of students' educational and cognitive activity (Fig. 5).

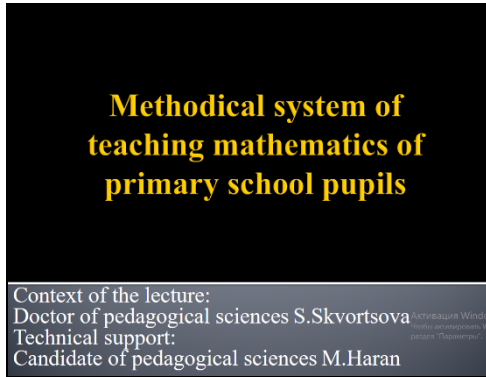


Figure 1: Theme of the lecture
Source: Own work

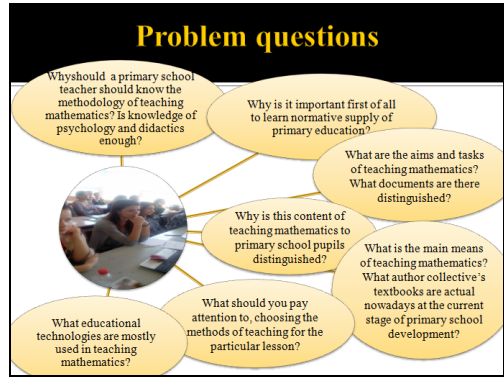


Figure 2: Problem questions
Source: Own work

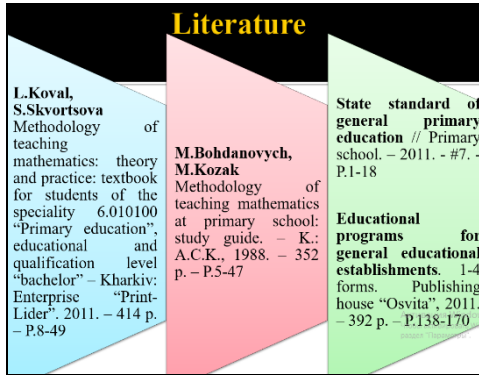


Figure 3: References Literature
Source: Own work

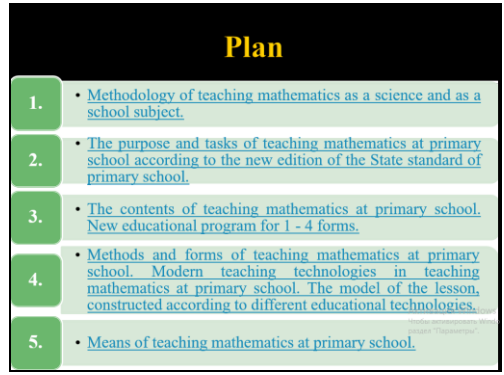


Figure 4: Plan of the lecture
Source: Own work

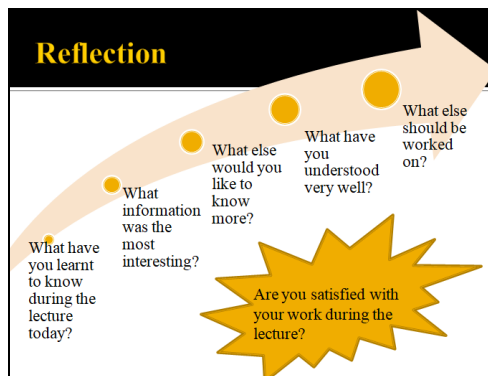


Figure 5: Reflection
Source: Own work

We should note that each question of the lecture plan also represents the multimedia presentation, which in its turn may contain hyperlinks to normative documents, current textbooks, videos of math lessons at primary school, presentations for mathematics lessons, conducted by teachers and students, etc. It should be mentioned, that issues that include hyperlinks to other files, in addition to the presentation file, also include document files, textbooks, video fragments of real math lessons at primary school, etc., presented in the same archive.

Constructing lectures with the help of the constructor of lecture presentations, the teacher can not only select topics, separate questions, slides in accordance with his / her normative / work programme of the discipline, but also make adjustments to them.

1.2 Methodical reference point of organization of a lecture session on the methodology of teaching mathematics using the constructor of lecture presentations

The constructor of lecture presentations on the discipline "Methodology of Teaching Mathematics" is one of the components of the multimedia methodical discipline complex (Skvortsova, 2017), which operates on the basis of the "Moodle" platform in the distance education system "KSU Online". To work with the constructor, go to the link <http://ksuonline.kspu.edu/course/view.php?id=1078>, select the necessary section and the subject of the training content (Fig. 6), and go to the block "Constructor of lecture presentations" (Fig. 7).

It should be noted that the entire complex in general, and the constructor of lecture presentations in particular, is available without registration. In this case, the teacher of methodology of teaching mathematics can use the presentation constructor online or download it to the computer.

Let us consider the teacher's actions to prepare a multimedia presentation supporting the lecture with the help of the constructor of presentations.

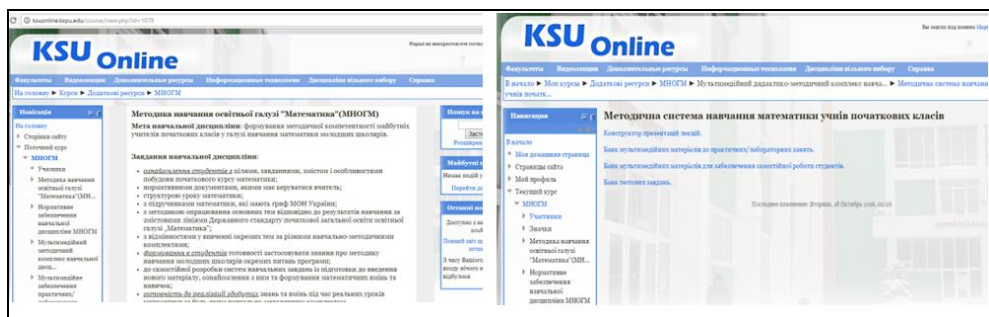


Figure 6: Multimedia Methodological Complex of the discipline

Source: Own work

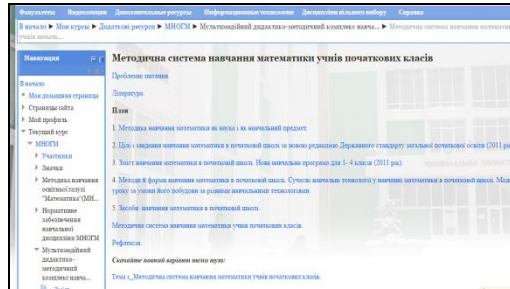


Figure 7: Constructor of lecture presentations on the topic “Methodical system of teaching mathematics to primary school pupils”

Source: Own work

As it was mentioned above, the constructor of lecture presentations in accordance with each topic, contains an ordered set of presentations that the teacher can use to create his own lecture presentation. In order to create a presentation supporting the lecture, using the materials of the constructor, the teacher of methodology of teaching mathematics, first of all, must take into account the normative / work programme of the discipline "Methodology of Teaching Mathematics", and according to it, outline the topic and the list of issues that reveal its contents; determine the number of lecture hours planned for mastering the topic, and only then start a multimedia presentation for the lecture / lectures on the topic (Haran M., 2016).

Preparing a lecture on the methodology of teaching mathematics using the constructor of lecture presentations, the teacher must find out if he is going to use a multimedia presentation throughout the class, or only at a particular stage. If the lecturer plans to illustrate a separate stage of the multimedia presentation, then he chooses the questions from the theme of the constructor to help to realize this goal. When the teacher is going to provide multimedia support throughout the lecture, he includes the system slides related to the organization of educational and cognitive activities of students (recommended literature, problem questions, lecture plan, reflection of educational activity, Figures 1-5) in the lecture presentation, adjusting them if it is necessary.

It is worthy of note that the content of the topic in the constructor of presentations is as complete as possible, it is obvious that the teacher plans to analyse perhaps not all the issues of the lecture. Therefore, having familiarized himself with the plan of the theme in the constructor (fig. 1), the teacher should compare it with the content of the topic described in his own normative / work programme of the discipline "Methodology of Teaching Mathematics", on the basis of this, choose points of the theme plan from the constructor of presentations. In the constructor of presentations, the plan items of the lecture reflect the problematic issues that motivate students' learning and cognitive activity. During the next step, based on the chosen plan items, the teacher, if it is necessary, corrects the question on the

motivational slide (Fig. 2), on the slide with the recommended literature (Fig. 3) and on the slide with the lecture plan (Fig. 4).

As noted above, next to the motivational slide, given to each topic, the constructor of presentations has a slide, associated with it, the purpose of which is to summarize the lecture and reflect students' own educational and cognitive activity (Fig. 5). Reflection occurs after considering all questions of the lecture; it allows students to speak about how they understood and mastered its content, but also to talk about their satisfaction from their own educational and cognitive activity at the lecture, to analyse why this happened one way or another; to explore the connection between what is already known and what else you need to learn, outline new topics for reflection, and so on. Obviously, the teacher should motivate students to evaluate judgments with questions, such as: "What have you learnt today during the lecture?", "What information was most interesting?", "What else would you like to know?", "What have you understood well?", "What else should you do?", "Are you satisfied with your work during the lecture?" Meanwhile, the lecturer can supplement or, conversely, reduce the list of questions, taking into account their own vision of this stage of the lecture and the educational and cognitive needs and opportunities of students.

The list of basic and additional literature, links to Internet resources are given in the normative / work programme of the discipline "Methodology of Teaching Mathematics". Guided by this list, the lecturer chooses on the slide with the list of recommended literature the sources that he considers necessary to recommend students for their independent work. It is worthy of note that the teacher can add other sources. If a source from the given list is, in his opinion, not appropriate, then the teacher can remove it or replace it with another.

Having found out the issues of organization of educational and cognitive activity of students (in particular, motivation and reflection), having characterized the content of the topic by the Typical educational programme, having chosen the recommended literature and the plan of the lecture, the teacher should familiarize himself with the content of the above-mentioned plan issues of the topic in the constructor of presentations. Every issue in terms of the theme in the constructor is also a multimedia presentation and can be shown by the hyperlink, going to which the teacher can analyse the content of the slides, choose those, which in his opinion, reflect the content of the question.

As teaching mathematics at primary school is accompanied by visibility, slides with visual aids and didactic material are suggested for each topic in the constructor of presentations, which the lecturer can also change according to his own understanding of this issue.

It should be mentioned, that each topic of the constructor of lecture presentations on the methodology of teaching mathematics contains issues related to the programme requirements and the order of studying the topic by the current

textbooks. The teacher can include these slides in his presentation of a lecture or offer students for independent work.

It should be noted that creating a presentation of a lecture with the help of the constructor, the teacher has the opportunity to make changes in the content of both presentations and individual slides, in accordance with the cognitive needs of students and their own vision of the content of the lecture. Thus, the lecturer can, for example, reduce the number of examples given to solve certain tasks, show not all of them, but only individual methodological approaches, etc.

We emphasize that each topic is shown completely in the constructor of presentations, pointing out the various methodological approaches, a sufficient number of examples of handouts, including examples of educational tasks and their solutions that are both, ready and with dynamic development of writing the solution. However, paying attention to the limited time of a lecture, a teacher, creating his own lecture presentation with the constructor may take only a few slides and other content to leave to students' independent work or suggest to learn them during a practical lesson. On the other hand, in order not to destroy the integrity of the tasks aimed at the formation of a certain skill or abilities, while also reducing its processing time, the teacher can show some solutions, given in the constructor in dynamic or statically, changing the animation settings.

In addition, if it is necessary, the lecturer can create his own lecture presentation directly from several themes of the constructor. For this purpose, the teacher should choose from the certain themes of the constructor those questions that he plans to reveal during the lecture, taking into account only the logical combination of the material. The final presentation will have a complete and finished look, as all presentations of the constructor have the same design, the same SmartArt templates for structuring similar issues and common stylistic design (Meixner, 2017).

Consequently, the constructor of lecture presentations used for teaching the discipline "Methodology of Teaching Mathematics" gives a lecturer the opportunity to create his own lecture presentations without any excessive efforts, choosing separate questions on the topic in accordance with the normative programme. In addition, the teacher has the opportunity to use the lecture presentation, in which all the questions are presented entirely with the help of the existing hyperlinks. Such a presentation is provided in the constructor as an archive (Haran, 2016).

It should be mentioned that the constructor is only an auxiliary means of acquiring educational information by students. The teacher of methodology has certain degrees of freedom in his own comments, as the contents of the presentation is presented briefly and concisely, without unnecessary text arrays, in order to minimize a theoretical aspect, and through the practical demonstration the use of basic methods to facilitate students' perception and comprehension of the educational information.

1.3 Organization of experimental training with using the constructor of lecture presentations

The formative stage of the pedagogical experiment lasted for four academic years (2014-2018). Since the academic discipline in different universities is taught for 2-3 semesters, two streams of students in each of the educational institutions were involved in the experiment. In total, 6 teachers (lecturers) of the methodology of mathematics teaching participated in the experiment: Kostiantyn Ushynsky PNP (1 teacher), KSU (1 teacher), Vasyl Stefanyk PNU (2 teachers), Bohdan Khmelnytsky Cherkasy National University (1 teacher), Izmail State Humanities University (1 teacher).

To choose the control and experimental groups that participated in the experiment, a survey of teachers of the discipline was conducted in the form of a questionnaire before its beginning. As the sense of the experiment was in the creation and use of multimedia lecture presentations, the purpose of the questionnaire was to find out the level of using computer technologies by respondents, the projector and, above all, the program for creating and editing presentations - Microsoft Power Point.

According to the results of the survey it was determined that all teachers (100%) have computer skills and have experience in using the computer and the projector in their professional activities. When determining their own level of computer skills on the scale "bad / mediocre / good / perfect", all respondents answered "good". Similarly, all lecturers indicated that they had the skills and experience with the Microsoft Power Point program. In particular, they can use Power Point templates (100% of respondents); execute text on slides (100%); add and format images (100%); add video and sound (83.3%); adjust the transition animation between slides (83.3%); add tables, graphs, charts (66.7%); add hyperlinks and controls (66.7%); use SmartArt objects (50%); adjust the animation of the text (50%) (see Table 1).

Table 1.

Ability to use, work on presentations in the program Power Point (Smyrnova–Trybulska E., 2016)	Teachers, participating in the survey						
	K.Ushynsky PNP	KSU	V.Stephanyk PNU 1	V.Stephanyk PNU 2	B.Khmelnytsky Cherkasy National University	Izmail State Humanitarian University	
use templates	+	+	+	+	+	+	
fill out the text on the slides	+	+	+	+	+	+	

add video and sound	+	+		+	+	+
customize the transition animation between slides		+	+	+	+	+
add tables, graphs, charts	+		+	+		+
customize text animation	+	+				+
add and format images	+	+	+	+	+	+
add hyperlinks and elements of control	+	+	+		+	
use SmartArt objects	+	+		+		

Source: Own work

Thus, it was stated there is approximately the same level of the basic skills of working with the Microsoft Power Point software and the computer in general among all the interviewed teachers, so a control and an experimental group of teachers were formed. The experimental group included the teachers of the Kostiantyn Ushynsky PNP, KSU, and one of the lecturers of the Vasyl Stefanyk PNU. The control group consisted of teachers of the Bohdan Khmelnytsky Cherkasy National University, Izmail State Humanities University and Vasyl Stefanyk PNU. Each group included 3 teachers.

It should be mentioned, that all participants of the research, prior to its beginning, had conducted lectures mainly without any use of information technologies. In the course of the forming experiment, teachers of the methodology of teaching mathematics conducted lectures with multimedia presentations, while the teachers of the control group tried to create lecture presentations on their, without any use of the constructor of lecture presentations, while the teachers of the experimental group used the constructor of multimedia presentations to create their lecture presentations.

The lecture presentations created by the teachers of both groups were analysed according to the results of the experiment. The main feature of the presentations, created by the teachers of the control group, is the large text arrays (the presentation slides represent almost the entire summary of the lecture). While there are almost no texts in the experimental group, the material is structured using SmartArt templates. Regarding the presence of animation effects, we noted that the presentations, created by the teachers of the control group, are mainly characterized by the lack of animation effects, presentation in the final form of the content of the lecture fragment on the slide, available only in coloured underlining. Instead, there is a widespread use of animation effects (selection, movement, appearing and disappearing in the presentations of the experimental group participants); a gradual deployment of the content is achieved with the help of animation effects and so on.

Obviously, the presentations of the control group of the teachers demanded from the students certain efforts to understand and understand logically the content of the lecture. The presentations of the teachers of the experimental group helped students to perceive and understand the educational information without making much effort on the part of the sense organs. It should also be pointed out that there were differences in the form of presentations. There were presentations for individual lectures, done with using different design options in the control group, in experimental - the only design for all presentations, and in accordance with generally accepted requirements for the slide appearance.

Upon completion of teaching the methodology of teaching mathematics, a questionnaire was offered to both groups of lecturers meant to find out the features of preparing and conducting lectures. Questionnaires were aimed at identifying both objective (the time spent for preparing a lecture presentation, the pace of the lecture, the volume of the content of the topic that is outlined during the lecture, the students' activity during the lecture, the clarity of the content of the lecture) and subjective (assignment for the teacher, freedom in the teaching content, attachment to the text of the lecture, the opportunity for creativity, informal communication, satisfaction from their own work) characteristics.

So, assessing the time spent preparing the presentation for the lecture, the teachers of the experimental group took an average of 0.5-2 hours, while the teachers of the control group indicated from 3 to 6 hours. Although participants in both groups received an increase in the content of the lecture, 100% of the teachers of the experimental group achieved a significant increase of the pace of the lecture using the presentation, unlike the usual lecture, while the teachers of the control group did not see a significant increase in the pace, only a third indicated the faster rate of the lecture. All the teachers of the experimental group noted that students during the lecture are much more active than usual. However, in the control group, only 33% of the teachers noted an increase in student activity. During the lecture, teachers constantly give feedback, therefore, all without exception, pointed out that delivering lectures with the help of presentations contributed to a better understanding of the educational content. In addition, students' comments about the results of their own educational and cognitive activity during the lecture at the reflection stage indicate more conscious and meaningful perception of the educational material.

Analysing subjective characteristics, all participants of the experiment (100% of respondents) achieved a decrease in the teacher's load during the lecture. And the teachers of the experimental group even pointed out that using lecture presentations, they could enjoy the freedom in teaching educational content, as it is presented in structured form on the slides of the multimedia presentation, so there is no need to read arrays of text from the slide of the presentation; the teacher should concentrate enough on commenting on certain slides. Also, using multimedia lecture presentations offers an opportunity to suggest students analyse and comment on some slides of the presentation to raise their educational and

cognitive activity. Teachers from both the control and experimental group stated that using presentations makes it possible not to depend on the text of the lecture (or even not to use it at all) because the lecture plan and its main points are presented in the presentation. The teachers also mentioned that the slides of the presentation always return to the educational contexts and do not give an opportunity to move away from the topic of the lecture. It should also be noted that most of the teachers (67%) of the experimental group indicated an increase of satisfaction from their own work.

So, all the interviewed teachers confirmed that the presentation of the lecture material in the form of a multimedia presentation facilitated the better and more informed perception and mastering of the material by future teachers of primary school. And the teachers who created their presentations with the help of the constructor of lecture presentations summarized the level of attention and activity of students during the lesson was higher in comparison with the traditional lecture. The motivation of students to master the methodology of teaching mathematics was significantly higher, according to the teachers of the experimental group, than of previous courses, where teaching was carried out without using the lecture presentations. Teachers indicated that using presentations, created with the help of the constructor, the pace of lectures increased, which allows them to consider more questions during the lesson, illustrate them with more examples, and so on. Consequently, using the constructor of lecture presentations on the methodology of teaching mathematics contributes to an increase in the intensity of teaching.

In addition, the lecturers noted that using the constructor of lecture presentations reduces the teacher's load during the lecture, as they only have to comment on the slides of the presentation, without making any effort and not being distracted to make notes on the board.

Thus, the results of the research indicate that the developed constructor of lecture presentations on the methodology of teaching mathematics helps to organize the educational process better and increase its efficiency.

CONCLUSIONS

Application of information technologies in the sphere of presentation of educational information, in particular in the form of multimedia presentations, is one of the ways to increase the efficiency of lectures.

The necessity to create presentations and their use during the course of teaching methodology of teaching mathematics was recognized based on the survey of teachers. The analysis of the normative and work programmes of the discipline "Methodology of Teaching Mathematics" led to the conclusion that significant differences in the content and amount of the educational material made it impossible to create the system of lecture presentations which would simultaneously correspond to all normative curricula of the discipline used during

the training of students of the specialty "Primary Education" at different universities of Ukraine. Instead, these differences highlighted the need to build a flexible logically structured constructor, enabling the user (the teacher of the methodology of teaching mathematics) to create a perfect presentation for the lecture, selecting those slides that, in his opinion, reveal the topic in the amount provided by the course programme, spending pursuing this task a minimum amount of time and effort. Thus, the constructor of multimedia lecture presentations on the discipline "Methodology of Teaching Mathematics" and the methodological guide for creating own lecture presentations and organizing lectures based on the constructor were developed.

According to the results of the implementation of the constructor of lecture presentations in the educational process of 3 Ukrainian universities preparing students of the specialty "Primary education", the teachers of the discipline "Methodology of Teaching Mathematics" acknowledged the increase of the intensity and quality of education. Thus, the constructor of lecture presentations is an effective means of providing instruction on the methodology of teaching mathematics.

REFERENCES

- Haran, M., (2016). *Methodology of using multimedia methodical complex of the educational discipline "Methodology of teaching the educational branch "Mathematics"": [method. recommendations]*. Kherson: PE Vyshemyrsky V., 2016, 108 p. [In Ukrainian]
- Meixner, B., (2017). *Hypervideos and Interactive Multimedia Presentations*. Journal ACM Computing Surveys (CSUR), Volume 50, Issue 1, Article No.9.
- Skvortsova S., Haran M. (2015) *The state of the practice of training future teachers of primary school for teaching mathematics to pupils at higher educational institutions of Ukraine*. Modern primary education: traditions, innovations and perspectives: materials of the International scientific-practical conf., Kherson, March 19-20, 2015, P. 101 - 105.
- Skvortsova, S., Haran, M. (2017). Training for primary school teachers in teaching mathematics using information technologies. In Eugenia Smyrnova-Trybulska (ed.), *Effective Development of Teachers' Skills in the Area of ICT and E-learning*, Vol. 9. Series of E-learning. Katowice-Cieszyn: Studio Noa for University of Silesia, ISSN: 2451-3644 (print edition) ISSN 2451-3652 (digital edition) ISBN 978-83-60071-96-0, 497 p. pp. 419-436
- Smyrnova-Trybulska, E., Ogrodzka-Mazur, E., Szafrńska-Gajdzica, A., Drlík, M., Cápav, M., Tomanová, J., Švec, P., Morze, N., Makhachashvili, R., Romanyukha, M., Nakazny, M., Sorokina, L., Issa, Tomayess, Issa, Theodora (2016).

Recommended Applications for Making Presentations and Didactic Videos. Some Research Results. In: M. Turčáni, Z. Balogh, M. Munk, Ľ. Benko (Eds), DIVAI 2016 – Distance Learning in Applied Informatics. 11th International Scientific Conference on Distance Learning in Applied Informatics Conference Proceedings, 2–4 May 2016 (pp. 235–246). Constantine the Philosopher University in Nitra, Faculty of Natural Sciences, Department of Informatics, Nitra: Wolters Kluwer. ISBN 978-80-7552-249-8. ISSN 2464-7470 (Print) ISSN 2464-7489 (On-line).