

## The using multimedia means in the training of primary school teachers in Ukraine: realities and prospects

S. O. Skvortsova<sup>1</sup>, M. S. Haran<sup>2</sup>

South Ukrainian National Pedagogical University named after K. D. Ushynsky, Odessa, Ukraine  
Kherson State University, Kherson, Ukraine

\*Corresponding author. E-mail: skvo08@i.ua<sup>1</sup>, marinochka88\_30@mail.ru<sup>2</sup>

Paper received 02.05.2016; Accepted for publication 15.05.2016.

**Abstract.** The article outlines the possibilities of using information technologies in the training of future primary school teachers to study mathematics and the structure of providing of multimedia support of the course “Methods of teaching of the educational branch “Mathematics”” is proved, which includes: designer of lectures presentations; bank of multimedia materials for practical/laboratory lessons; multimedia support of independent work; computer tests on selected topics of the course.

**Keywords:** *academic discipline Methods of teaching of the educational branch “Mathematics” (MTEBM), information technologies, multimedia support.*

In terms of European integration Ukraine is in the active phase of reforming all spheres of the society, including the educational sector. The international community considers just the qualified education as one of the most important conditions for successful development of the country. And the European Union considers the qualified education primarily as a tool for economic growth towards the development of professionally capable and dynamic community. The issue of mathematics education requires special attention as its quality is considered an indicator of readiness of the society to socio-economic development and individual mobility in mastering and implementation of new technologies, perception of scientific and technical ideas. The foundations of mathematical education of the society are laid just at primary school during studying the educational branch “Mathematics” by primary school pupils, which purpose is precisely in forming the subject mathematical and key competencies, which are necessary for pupils for successful learning and self-realization in the rapidly changing world. Therefore, special attention should be paid to improving the training of future primary school teachers for teaching primary school pupils in mathematics. One of the provisions of improving the quality of training future primary school teachers to teaching mathematics the students we see in using modern, including information, technologies.

The training of students of the direction Primary education is directly to primary school pupils teaching mathematics is carried out by means of the discipline “Methods of teaching educational branch “Mathematics”” (hereinafter MTEBM). **The aim of our research** is the theoretical foundation and practical development of multimedia methodological support of the discipline MTEBM. It should be noted that in Ukraine there are no such studies, only there are a few works related to the development of electronic methodical complex for the discipline MTEBM within distance learning [6, p. 40]. Therefore, to determine the current state of practice of training of primary school teachers by the means MTEBM the ascertaining experiment was held in 2012 – 2014, it was realized in several phases.

In the first phase, we did a comparative analysis of regulatory programs of the discipline MTEBM of 14 different higher education institutions (HEIs) of Ukraine that train future primary school teachers [5]. According to

the results of the analysis it was found out that the educational and professional program does not provide the same number of academic hours for mastering the discipline for all students of the field of study 6.01.01.02 Primary education regardless of the institution, but the ratio of classroom hours is determined by educational institutions ranging from one to two-thirds of the total training time and rest hours are devoted to independent and individual work, which causes significant differences in the number of lectures, practical/laboratory lessons. In addition, HEIs distribute the content of the modules of the discipline MTEBM in different ways: we found a difference in structuring the content of educational material of the course MTEBM as a whole, and in the structure of individual content modules.

Thus, according to the results of the first phase of ascertaining experiment, we came to the following conclusions: educational establishments distribute the academic workload for classroom and independent work with the same total number of hours differently, that determines, first of all, the difference in the number of lectures, as with the entire course MTEBM in general and in specific content modules that in the context of our research makes it impossible to create a single complex of lectures presentations of this discipline, and shows the need in the development of a flexible structure that would allow every teacher, depending on available time and individual needs of the audience, create a lecture presentation with minimal spending time and efforts.

In addition, we have found out discrepancies between the content of the discipline MTEBM, mentioned in educational qualification characteristics of the industry standard and professional functions and typical tasks of activities and skills that correspond these common tasks. However, the content of the discipline MTEBM requires consideration of the revised regulatory support of primary education of Ukraine, including the State standard of primary general education and new training programs. The above mentioned facts have caused the need for justification of appropriate educational discipline content corresponding to the present stage of the development of primary education in Ukraine. According to the result of the analysis of the industry standard of the field of study 6.01.01.02 and updated regulatory support of primary education in Ukraine we consider the appropriate course MTEBM should include the following sections:

1) The content of the initial course of mathematics and regulatory support of teaching mathematics at primary school. Methods of teaching mathematics as a science and as a subject.

2) Modern mathematics lesson in primary school: technological approach.

3) Methods of teaching content lines: numbers, operations with numbers; values; mathematical expressions, equations and inequalities; plot tasks; spatial correlation, geometric shapes [2].

In the methods of teaching each content line we should pay attention to the implementation of content line "Work with Data", which is repeatedly referred to the complete course of primary school mathematics. Obviously, this content can be differently structured in thematic modules, but in our opinion it is obvious, because it reflects the requirements of Industry standards and the new edition of the State standard of primary general education.

The second stage of the ascertaining experiment had the purpose to find out what teaching tools are used by lectures of universities during teaching the discipline MTEBM. A survey was chosen as the leading research method to solve this issue, which was done by 20 teachers of the discipline MTEBM of higher educational institutions who train future primary school teachers and regional institutions of postgraduate education, which do retraining (professional development) of primary school teachers.

In the result of processing questionnaires we found that all surveyed teachers feel the need to use information technologies in the training of future primary school teachers for teaching mathematics. Thus, the vast majority of teachers believe in the usefulness of using information technologies during lectures (95%) and practical lessons (95%) and control measures (80%), independent work (70%). However, despite the awareness of teachers about the need and feasibility of using information technologies in the process of teaching MTEBM, only 20% of them confirmed that they always use them during their work in the classroom, the rest do that sporadically.

The main means of information support of the lectures are multimedia presentations of lectures. So, all the teachers who participated in the survey (100%) unanimously see the need to use presentations at MTEBM lectures. The results of the conducted survey show that mostly teachers have been using presentations during the lectures in MTEBM (80%); but only 20% of respondents confirm that always use presentations during lectures, but most often reflect the text of the lecture in a presentation or text slides with the main thesis of the lecture. This is not quite optimal use of possibilities of presentations during lectures, in our opinion, due to the fact that most teachers do not know good enough the program Microsoft Power Point to create them (this particular program, according to the survey, 100% of respondents use to create, view presentations and demonstration of presentations), only 30% of them are fluent with this program.

Thus, as a result of the ascertaining experiment, we ascertained in the need to develop multimedia presentations of lectures of the discipline MTEBM in which educational content is presented in a structured way, using animation effects, including color effects, during its showing; method of work on certain mathematical tasks are given by dynamic deployment of its solution, etc.

However, paying attention to the differences in the distribution of content of the discipline to thematic modules, the differences in the issues dealing within the same module, in different universities of Ukraine, we developed the designer of lectures presentations.

In our research we understand designer of lectures presentations as the file directory structured in three thematic sections: 1. The content of the initial course of mathematics and regulatory support of teaching mathematics at primary school. Methods of teaching mathematics as a science and as a subject. 2. Modern mathematics lesson in primary school: technological approach. 3. Methods of teaching content lines: numbers, operations with numbers; values; mathematical expressions, equations and inequalities; plot tasks; spatial correlation, geometric shapes. Each section contains an ordered set of presentations on topics that the teacher can use both in full (available via hyperlinks) and selecting only certain questions of lectured plan, which are separate files – block of the designer.

All presentations are part of the designer with a single stylistic design and are developed with paying attention to all methodological, pedagogical and psycho-physiological requirements [1; 2]. In addition, the proposed presentations of lectures have the same structure that includes: a title slide with the theme of the lecture; issues to the lecture; list of recommended literature; plan of the lecture; presenting main material; reflection [2].

The main content of the lecture, according to the plan, mainly includes issues such as: the content and results of learning of the theme according to the new program (2011 year with changes 2014-2015 years); visual aids and didactic material; order of study topics by current textbooks; teaching methodology of teaching individual themes; implementation of new curriculum content in current textbooks.

It also should be noted that the content of some methodological issues is also structured in a certain way. For example, methods of teaching numbering numbers at different concentrations include consideration of: the formation of numbers; the order of numbers in natural sequence; reading and writing numbers; composition of numbers; comparison of numbers; arithmetic with numbers under numbering, etc. Methods of forming computational skills of addition and subtraction involves consideration of: assume the list of calculations in certain concentration ("Ten", "Hundred", "Thousand", "Many-numbered number"), the procedure for their consideration; theoretical basis of the admission; actions and operations that comprise the admission; preparatory work for the introduction of computing admission; familiarization with the admission of calculation; formation of counting skill, etc. Methods of teaching solving tasks (simple tasks, composed tasks, typical tasks) include consideration of: the theoretical foundations (mathematical structure of the tasks and ways of their solving); preparatory work; familiarization; forming the ability to solve tasks; investigation of the task after its solving, etc.

In addition, in lectures presentations, the ability of using hyperlinks to specific regulations, textbooks, the possibility of including the presentation of fragments of video recordings of mathematics lessons at primary school, which illustrates the methodical reception at

mastering a particular skill or concept or an illustration of certain technology training and so on, are given. The training information is presented in a structured way on the slides of the designer presentation – in the form of charts and tables that facilitates perception, logical processing and storing educational information by students. Paying attention to the age peculiarities of cognitive processes of primary school pupils, methods of teaching mathematics is used based on visibility, so the presentation slides has the possibility to illustrate work with clarity, and – giving the record of solving some tasks in dynamics. This designer is only additional means to perception of educational information by students and the teacher of methodics has certain degree of freedom in his own comments to each slide.

Thus, the learning content in a presentation is given briefly and concisely, without unnecessary text arrays to minimize the theoretical load by demonstrating practical application of basic methods to facilitate student perception and understanding of educational information. To create a presentation of a lecture with the designer teacher should choose according to his own understanding some questions, that he plans to reveal at the lecture and select necessary slides to illustrate learning content. In addition, the teacher can make changes to the presentation in order to reflect the individual characteristics of students and creating conditions to satisfy their cognitive needs. Created by a teacher with the help of the proposed designer, presentation can be used throughout the lecture and can be controlled interactively.

As for the practical lessons, here, perhaps, more appropriate is to use a presentation as a part of a lesson, for example, in the introduction to repeat previously studied material or lighting work plan with hyperlinks to the regulatory framework or methodological literature, to which occasionally we can access during the lesson. According to the results of ascertaining experiment during practical/laboratory lessons, some teachers of MTEBM use multimedia presentations, most of them see the need to use only certain multimedia materials: 80% of teachers-respondents use teaching videos, but only 10% confirmed that they already had all the necessary math video lessons, and the rest – 90% of teachers – would like to have such banks of video to enhance the effectiveness of teaching the discipline MTEBM.

So as for the fact that at practical/laboratory lessons most of the training time is spent for simulating the professional activity of a teacher and its analysis, we refused to develop a set of presentations for practical lessons and created a bank of multimedia materials that the teacher of MTEBM, if necessary, may use to create his own presentations for practical and laboratory lessons, applying them to hyperlinks or use as multimedia support for individual stages of practical/laboratory lesson [4].

Under the bank of multimedia materials for practical lessons in the course MTEBM in our research we understand set of files ordered to such blocks: video materials; textbooks; regulatory support of educational branch “Mathematics”; presentation. The first block contains video lessons of mathematics in 1-4 grades and their fragments, as well as videos with solving specific tasks by pupils in mathematics, which are structured by topics and classes. The second block contains electronic

versions of textbooks in mathematics for 1-4 grades with the label of the Ministry of Education of Ukraine, divided to class. The third block consists of electronic versions of legal documents regulating educational process in primary school, including teaching educational branch “Mathematics” and includes a list of hyperlinks to relevant documents on the official website of Ministry of Education of Ukraine. In the block “Presentations” presentations for practical lessons on specific themes of the course and presentation slides containing the prepared solution of mathematical issues that are dynamically developed, and fragments of imitation of work with clarity and so on, are gathered. Each of the elements of the bank's media materials can be included by a teacher to the presentation, and used as a separate stage of practical lesson.

We have developed through lectures of Professor S. Skvortsova presentations for practical lessons on specific themes of the course MTEBM, containing fragments of video lessons in mathematics and provide their analysis. In our opinion, the inclusion to lecture presentations conspectus of mathematics lessons allow you to analyze and study the sequence of actions to prepare teachers for the lesson and improve the content of learning tasks. However, as it was noted earlier, we consider developing multimedia presentations of practical lessons to the whole course not appropriate, but offer the bank of multimedia materials instead.

The result of ascertaining experiment ascertained us that almost all teachers of methods in mathematics (95%) use information means for independent work of students in the discipline, preferably in the form of electronic documents (60%), Internet sites (60%) audio-video files (60%), e-books (55%). Much less methodists see information support of independent work in the application of distance learning courses (40%); training programs (35%); electronic test systems (30%); interactive tutorials (25%) and others. We believe this is primarily due to the lack of means or limited access to them. So, we had a task to organize the available multimedia and create a bank of materials for independent work, which is an expanded bank of multimedia materials for practical/laboratory work, by including in it existing in Ukraine electronic textbooks in MTEBM, electronic and multimedia textbooks for students, and most importantly – video lectures and/or presentations of lectures with sound.

Saying lectures presentations with audio commentary (thanks to the combination of audio and visual information, we conditionally call them video presentations) we mean the presentation, in which each theme is revealed in full value by prompting a sufficient number of examples and analysis of methodological approaches. To facilitate the perception of educational information, such presentation is structured according to the plan, which offers items for hyperlinks that enables students to master each lecture question separately. However, within each plan item, there also hyperlinks that can be used by students wishing to study academic disciplines at the highest level; there are hyperlinks that provide access to analytical information systems to learning tasks, etc. Thus personality-oriented approach is implemented and differentiated teaching the discipline of students is realized. Besides multimedia support of independent work of the discipline MTEBM in our research also includes e-

learning and training manuals on methods of teaching mathematics, links to the Internet resources that can be used during independent work, and the best examples of presentations of mathematics lessons fragments performed by students that can be used directly as a teaching material or as an example for future teachers to create their own presentations [3].

Regarding the use of IT as control measures, we consider it appropriate to use computer tests for evaluating educational achievements of students with the discipline MTEBM though computer tests cannot replace all types of control of educational achievements of students with the discipline MTEBM. Despite the fact that most teachers agree that computer tests will intensify the process of preparing students for practical lessons and workshops and teacher – to monitor its level effectively among students, that in its turn will reduce the number of students who come to the practical lesson without proper training, only 10% of respondents always use computer tests, 20% do this often, 50% - sometimes, and 20% have never used a computer test. This situation is explained by the presence in Ukraine completed tests to individual modules of the course, the lack of common methods of development tests of this educational discipline. So our challenge is to substantiate the method of making tests in the discipline MTEBM and its implementation with the example of some content modules.

So, as a means of control, with using information technologies, we offer computer testing, the use of which may be appropriate in implementing both the current and final control, as well as have training character. We offer tests on selected themes of the course MTEBM composed from various types questions (multiple choice, right/wrong, matching tasks, tasks requiring a short answer, numeric, tasks with one correct answer, the task with multiple right answers, task with establishment of order of operations fulfillment, etc.). Tests are the bank of questions structured by themes, from which random tests are formed.

Thus, the analysis of questionnaires and interviews of teachers the discipline MTEBM held during the ascertaining experiment, we were ascertained that today it is impossible to organize qualitatively the educational process of the discipline MTEBM without the use of educational means, created on the basis of information technologies, however, only 30% of teachers are satisfied with their own multimedia software discipline MTEBM, 20% – partially satisfied and 50% of respondents are not satisfied with the existing multimedia courseware. Therefore, the majority of teachers (85%) wished to have electronic educational-methodical complex for the discipline, only 10% of respondents already have it, and 5% have not decided yet, their wish will depend on the quality of the product. The majority of teachers would like to have in multimedia software: slides of presentations of lectures with animation, with the possibility to design lectures (Designer of lectures presentations) (85%); bank of multimedia materials for practical lessons (85%); bank of videos of real mathematics lessons (80%); computer tests (80%); presentation of the practical lessons (75%); electronic guidance manual (60%); electronic textbooks on mathematics teaching methods (55%); video lectures or lectures presentations with audio support (55%); electronic legal documents (50%); electronic textbooks in math 1-4 grades (40%); and 5% would like to have other materials for the control.

Thus, we have created the multimedia support of the discipline MTEBM, which includes: designer of multimedia presentations for teacher's own choice, separate slides and creating their own presentation based on own lecture; bank of multimedia for practical/laboratory work (videos, electronic versions of textbooks, regulations, manuals for teachers, etc.); multimedia support for independent work (electronic textbooks and manuals, including interactive tutorials and guidance manuals, video lectures, presentations of lectures with sound, Internet resources, etc.); computer tests for training and control.

#### REFERENCES

1. Гаран М.С. Вимоги до створення презентацій лекцій з навчальної дисципліни "Методика навчання освітньої галузі "Математика"" (МНОГМ) / М.С. Гаран // Матеріали міжнародної інтернет-конференції "Дидактика початкової школи: реалізація технологічного та компетентнісного підходів", м. Миколаїв, 10 квітня 2015 р. // Методичний вісник науково-дослідницької лабораторії дидактики початкової освіти / гол. Осадченко І.І. – Миколаїв: ТОВ "Ілюн", 2015 – Вип. I – С. 90–95.
2. Гаран М.С. Конструктор презентацій лекцій, як засіб навчання студентів дисципліни "Методика навчання освітньої галузі "Математика"" (напрямок підготовки "Початкова освіта") / М.С. Гаран // Матеріали міжнародної науково-практичної конференції "Проблеми математичної освіти (ПМО – 2015)", м. Черкаси, 4-5 червня 2015 р. – Черкаси : ЧНУ ім. Б. Хмельницького, 2015. – С. 251–253.
3. Сковорцова С.О. Застосування мультимедійних технологій у процесі опануванні студентами навчальної дисципліни "Методика навчання освітньої галузі "Математика"" / С.О. Сковорцова, М.С. Гаран // Вісник Черкаського університету. Серія педагогічні науки. – 2015. – №20. – С. 19–26.
4. Сковорцова С.О. Особливості організації практичних занять з курсу "Методика навчання освітньої галузі "Математика"" (МНОГМ) з використанням інформаційних технологій / С.О. Сковорцова, М.С. Гаран // Матеріали Міжнародної науково-практичної конференції "Педагогічні ідеї Софії Русової у контексті сучасної освіти", м. Чернігів, 18–19 лютого 2016 р. – Чернігів : Десна Поліграф, 2016. – С. 199–201.
5. Сковорцова С.О. Стан практики підготовки майбутніх учителів початкової школи до навчання учнів математики в ВНЗ України / С.О. Сковорцова, М.С. Гаран // Матеріали Міжнародної науково-практичної конференції "Сучасна початкова освіта: традиції, інновації та перспективи", м. Херсон, 19-20 березня 2015 р. – Херсон : ХДУ, 2015. – С. 101–105.
6. Стрілець С.І. Основи роботи в середовищі Moodle. Навчальний посібник / С.І. Стрілець, Т.П. Запорожченко. – Чернігів : Чернігівський національний педагогічний університет імені Т.Г. Шевченка, 2015. – 44 с.

#### REFERENCES

1. Haran M.S. Requirements for creating presentations of lectures of the discipline "Methods of teaching educational branch "Mathematics"" (MTEBM) / M.S. Haran // Materials of the International Internet Conference "Didactics of primary school, and the implementation of technological competence approach", Mykolaiv, April 10, 2015 // Methodical research

- of the scientific research laboratory of didactics of primary education / head. Osadchenko I.I. – Mykolaiv: LLC “Iliuon” 2015 – Vol. I. – P. 90–95.
2. Haran M.S. Designer of lectures presentations as means of teaching students the discipline “Methods of teaching educational branch “Mathematics”” (field of study “Primary education”) / M.S. Haran // Materials of the International scientific-practical conference “Problems of mathematical education” (PME – 2015), Cherkasy, 4-5 June 2015 – Cherkasy : The Bohdan Khmelnytsky National University of Cherkasy, 2015. – P. 251–253.
  3. Skvortsova S.O. The use of multimedia technologies in mastering by student the discipline “Methods of teaching educational branch “Mathematics”” / S.O. Skvortsova, M.S. Haran // Bulletin of Cherkasskyi University. Series of pedagogical science. – 2015. – №20. – P. 19–26.
  4. Skvortsova S.O. Features of organization of practical lessons in the course “Methods of teaching educational branch “Mathematics”” (MTEBM) with using information technologies / S.O. Skvortsova, M.S. Haran // Materials of the International scientific-practical conference “Pedagogical ideas of Sofiya Rusova in the context of modern education”, Chernihiv, 18–19 February 2016 – Chernihiv : Desna Poligraf, 2016. – P. 199–201.
  5. Skvortsova S.O. State of the practice of training of future primary school teachers to teaching pupils mathematics at the university of Ukraine / S.O. Skvortsova, M.S. Haran // Materials of the International scientific-practical conference “Modern Primary education: traditions, innovations and prospects”, Kherson, 19–20 March 2015 – Kherson : Kherson State University, 2015. – P.101–105.
  6. Strilets S.I. Fundamentals of work in Moodle. Tutorial / S.I. Strilets, T.P. Zaporozhchenko. – Chernihiv : Chernihiv National Pedagogical University named after Taras Shevchenko, 2015. – 44 p.

**Использование мультимедийных средств при подготовке учителей начальной школы в Украине: реалии и перспективы**  
**С. О. Скворцова, М. С. Гаран**

**Аннотация.** В статье обозначены возможности использования информационных технологий при подготовке будущих учителей начальных классов к обучению математике и обоснованно структуру мультимедийного обеспечения учебной дисциплины “Методика обучения образовательной области “Математика””, которое включает: конструктор презентаций лекций; банк мультимедийных материалов к практическим/лабораторным занятиям; мультимедийное обеспечение самостоятельной работы; компьютерные тесты по отдельным темам курса.

**Ключевые слова:** учебная дисциплина МООМ, информационные технологии, мультимедийное обеспечение.