METHODOLOGICAL MODEL FOR TRAINING STUDENTS IN PEDAGOGY ON THE USE OF ELECTRONIC RESOURCES IN TECHNOLOGY EDUCATION AT PRIMARY SCHOOL

Nikolay Tsanev

Sofia University "St. Kiment Ohridski" – Faculty of Educational Studies and the Arts Bulgaria,
n.tsanev@fppse.uni-sofia.bg

Abstract: This paper examines a methodological model for training students in pedagogy on the use of electronic resources in technology education at primary school level. The model is based on two main approaches – organizational and didactic. The organisational approach includes three types of preparation including general pedagogical training; subject-specific didactic training for teaching Technology and Entrepreneurship and postgraduate qualification. The didactic approach relates directly to the training of students at the subject level. In general, it covers an overview of all categories of resources and the methodological guidelines for their use, as well as independent practice on the electronic platform. This process is closely related to the integration of information and communication technologies in the use of electronic resources in all aspects, as well as familiarisation with the methodology of their application in the subject Technology and Entrepreneurship at primary school.

Since 2015, the new electronic resources in the subject kits have been changing seriously the learning environment and creating prerequisites for new methodological approaches to teaching. Their more important characteristics are that they: motivate students and teachers; complement teaching and learning with new activities; make teaching and learning more attractive for teachers and students; allow for independent work; provide easy and fast feedback interactive learning; show the need for technology in every person's life; expand the content horizontally (at topic or section level), providing more opportunities to consolidate and enhance students' knowledge and skills; ensure easy and fast orientation in the content; provide tools for better viewing of electronic textbook pages.

Methodological guidelines have been developed and presented to each group of electronic resources. They guide students and teachers to specific learning activities.

The proposed methodological model for preparing students in pedagogy how to use electronic resources for teaching technology at primary school is an option to optimise students' learning. The most important conclusions resulting from this research are related, in the first place, to the need of organised, structured and adapted to the conditions in Bulgaria optimisation of initial teacher training in connection with the new electronic resources. As a consequence, knowledge of these resources, their capabilities and the methodology employed in the Technology and Entrepreneurship lesson will provide better didactic results.

Keywords: methodological model, electronic resources, technology education, training of students in pedagogy.

1. INTRODUCTION

In 2015, the regulations adopted updating the educational documentation resulted in a number of changes. Electronic resources (ER) became part of the subject bundles. As it is stated in the Teacher's book for Technology and Entrepreneurship: "The subject bundle consists of a textbook, an album with supplements and materials for students to use for the assignments in the textbook, a teacher's book. The electronic version of the textbook enables teachers and students to use it in an interactive mode" (Tsanev & al., Kniga za uchitelya po tehnologii i predpriemachestvo za 1. klas (Teacher's book in Technology and Entrepreneurship for 1st grade), 2016).

Along with the new subject bundles and e-platforms, two new categories of ER have emerged – electronically readable textbooks and electronic textbooks (e-textbooks). The first are electronic products which content is completely identical to the content of the approved print textbooks and the second are electronic versions that are enriched with additional electronic resources such as tasks, illustrations, information in the form of text, graphics, video and audio materials, various activities aimed at enhancing the content of the respective topic at the grade level. These new parts of the subject bundles are an indisputable advantage for modern day schooling.

2. HOW DOES ELECTRONIC RESOURCES IN THE NEW TECHNOLOGIES AND ENTREPRENEURSHIP SUBJECT BUNDLES CHANGE THE LEARNING ENVIRONMENT?

The new electronic resources, as part of post-2015 subject bundles, significantly change the learning environment

and create prerequisites for new methodological approaches to teaching. The most important features of these changes are that they:

- Help motivate students and teachers (in some cases parents as well)
- Complement teaching and learning with new activities
- Diversify and make teaching and learning more attractive for teachers and students
- Allow for independent work
- Provide easy and fast feedback
- Entail interactive learning
- Help clarify and justify the need for technology in every person's life
- Expand the content horizontally (at topic or section level), providing more opportunities to consolidate and enhance students' knowledge and skills
- Easy and fast orientation and viewing of a page, section, electronic resource
- The tools for better page viewing (zooming in and out, highlighting and circling, adding notes, etc.) make it easier and more convenient to use the e-textbook.

Since about 2005, the integration of information and communication technologies (ICT) into Bulgarian education has been not only desirable and necessary but also mandatory. New technologies are all around us and children are born and live with them. Similarly, "information technologies provide better communication between teachers and students as well as between students themselves" (Merdzhanov, 2018).

In a recent study, Delinesheva (2018) found that "teachers have the expectation and the attitude to use ready-made electronic content rather than to develop it themselves. This entails rethinking the digital competences needed by educators and placing greater emphasis on building the skills and confidence to design and test electronic content, as well as to share it with colleagues."

There are three main aspects of ICT integration:

1. ICT as an aid to everyday school work
2. ICT as a medium (LMS, platform) for pedagogical interaction
3. ICT as a school subject.

The use of electronic resources in Technology and Entrepreneurship covers all three aspects to a different degree. Stoyan Saev (2016) also notes that "university education must be reformed in the digital age in order to maintain its leading role in the field of education."

Asya Asenova and Kamelia Yotovska (2014). in their study on the use of electronic textbooks in Bulgarian school education, state, "The use of electronic textbooks would have a positive effect on the motivation of students (86% of the respondents). Their requirements are based on their experience as users of educational games on the Internet (84%), various applications (76%), digital books (42%)". The role of active learning in an integrated learning environment should also be noted. According to Lyuben Vitanov (2015),"In a more complex, committed and dynamic environment, teachers systematically and consistently develop students' knowledge, skills and attitudes without favouring or underestimating individual components."

The work of some authors is focused on comparative analyses of the new primary school study bundles (especially in mathematics). Different components of the educational content are discussed in a number of articles (Kirova, 2017). The analysis gives grounds to undertake a similar study for e-textbooks in order to prepare the students in pedagogy to work with them (Kirova, 2018).

The Strategy for the development of e-learning and distance learning at Sofia University presents the basic concepts and goals related to e-learning and some guidelines for their implementation. The need to combine traditional forms of teaching in lectures, seminars and practical exercises with the use of interactive electronic resources is emphasised. This implies that such types of resources should be explored and included in the pedagogical preparation of students (Sofia University, 2009).

This requires certain changes to be explored, arranged and implemented, to include specialised training so that the students will be acquainted with and trained how to use ER as part of the subject bundles in Technology and Entrepreneurship.
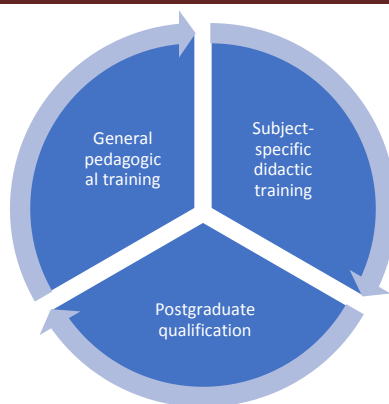
Fig. 1. General organizational approach to student preparation for using ER in teaching and learning

What does the student survey indicate before starting this type of training?

In 2019, a survey on the attitudes and willingness of students in pedagogy to work with ER was conducted within the project "Practical aspects of the preparation of students in pedagogy to work with electronic resources" implemented with the financial support of the Scientific Research Fund at Sofia University "St. Kliment Ohridski" under contract №80-10-170/16.04.2019. The answers outline clear trends regarding the need to use such resources as well as to have adequate preparation to work with them, although 44.6% consider themselves sufficiently prepared. However, 42.8% believe that it is necessary to include specialised training in university courses.

The changes that are proposed to take place in the preparation of students regarding the use of electronic resources in technology education involve two main approaches to the enhancement of students' preparation – a general organizational and a subject-specific methodological. The general organizational approach is based on three types of training including general pedagogical training; subject-specific didactic training and postgraduate qualification (Fig. 1.).

First type – general pedagogical training of students (within their overall preparation)

This type of preparation includes a test on students' basic computer skills resting on the European Computer Driving License – the certification programme accepted as the major benchmark for end-user digital skills certification in the European Union. As stated by 54.2% of the respondents, at least 2 hours of lectures and 2 hours of seminars should be included in the curricula for the course on didactics of technical appliances and technologies.

Second type – subject-specific didactic training (within the course on didactics of technical appliances and technologies)

The second part of the model is intended to include lectures and seminars explicitly designed to familiarise students with the specifics of ER on the electronic platform. It is recommended that students receive an induction to the ER I order to gain general overview of them. This can be done independently by providing each student with individual access codes to the platform.

Third type – postgraduate qualification after completion of university education

This part of the model is not directly linked to the preparation of students, however, it is an integral part of the factors that underpin the full use of ER on the publishers' platforms. The additional resources on the platforms supplementing the textbooks content and the other elements of the subject bundles are dynamic – they can be modified by updating existing materials and also by adding new ones.

The subject-specific didactic approach, is directly related to the training of students at the subject level. In general, it covers the induction to the categories of resources and the methodological guidelines for their use, as well as conducting independent practice on the electronic platform.

In that regard, the recommendations given by L. Alexieva (2019) to university lecturers and heads of units training primary teachers may also be considered:

- Include training related to the specifics of working with the ER for the respective subject, which should include familiarization with the pedagogical requirements for working with the ER.
- To offer student educators a broader range of elective courses to provide additional training in working with EPs.
- Provide knowledge of the ER quality criteria for student educators in disciplines offering ICT-related training, with emphasis on pedagogical and ergonomic requirements.

3. WHAT ARE THE MAIN TYPES OF E-RESOURCES AND WHAT OPPORTUNITIES DO YOU PROBVIDE?

The subject bundle in Technology and Entrepreneurship has a large number of various electronic resources for each grade from first to fourth. The total number of resources by grade available on https://anubis-bulvest.kitaboo.com are:

- Grade 1 - 148 resources
- Grade 2 - 89 resources
- Grade 3 - 144 resources
- Grade 4 - 91 resources

The main categories of electronic resources are the following:

1. Tasks to consolidate already acquired knowledge and skills in Technologies and Entrepreneurship
2. Short informational videos
3. Videos presenting the technology for making the items in each lesson
4. Worksheets for independent work
5. Brief pictorial instructions with audio prompts
6. Tests
7. Fun and entertaining tasks.

Each of the categories of resources listed above has its own specificity and should be used in accordance with the type of lesson, the didactic design of the lesson, the availability of the Internet and digital devices, and other factors that characterize the classroom environment. The characteristics and methodological guidelines for each group are presented below.

The first category, "Tasks to consolidate already acquired knowledge and skills", is frequently used. These tasks, which most often require students to complete a sentence, find a missing word in the text, find the right answer from a few different suggestions, associate an image with a word, etc., have their place in almost every lesson. They provide quick feedback, on the one hand, and enable students to test their knowledge themselves, on the other. They can be performed at the beginning as well as at the end of the lesson. It is appropriate to assign them for independent work, as well as for group or class work

The second category, "Short informational videos", is intended to provide students with concise but meaningful and engaging information on the topics in the syllabus. According to the preferred access and the teacher's instructions, students can watch the videos, which will facilitate the introduction of the topic as well as provide additional information. To use this resource efficiently, the location and timing of its use must also be well considered. It is not a good idea to overwatch videos. This is a useful resource, but students are in a passive position, which leads to diverting attention from the essential work in the classroom.

The third category of resources, "Videos presenting the technology for making the items in each lesson", is a central component of the electronic resources. In a short video, the whole technological process is shown, with an emphasis on the main steps of the process of making the item. The movie lasts about 3 minutes. Together with the demonstration, specific and precise work instructions are given. This makes it possible for the technology to be presented clearly and grasped fully. This resource can be used by both students and teachers. The video provides a great opportunity to showcase the process, but the "live" demonstration should not be completely ignored. It also has its place, especially for younger students.

The fourth category, "Worksheets for independent work" is intended primarily for students to work on their own. The worksheet supplements the topic of the lesson and sets out tasks that bring students' knowledge and skills into practice. Most often, this type of work is done in the lessons related to the entrepreneurship section, since in most of them no items are made, but there is another type of output – market research, consumer satisfaction questionnaire, business plan, etc. Students' performance can be assessed at the end of the lesson as well as after a certain period of time depending on the nature of the tasks assigned. Self-assessment is also possible and recommended.

The fifth category of activities is "Brief pictorial instructions with audio prompts". They are intended for quick and easy orientation in the new content on the topic, and are used primarily for independent work. The main importance of ER is that students have the freedom to use them as a database that they can access whenever needed.

The sixth category is "Tests". The ongoing effective feedback from students is a good condition for adequate planning and organisation of work. In addition to pre- and post-test as a diagnostics tool, aimed at establishing students' knowledge and skills at the beginning and the end of the school year, ongoing diagnostics is also required. It takes place at the section (global topic) and the lesson level of the syllabus. Various tasks for identifying and naming, grouping objects by a specific attribute, filling in the missing words into text, completing a sentence,

defining a sequence, presenting an idea, etc., are included in this type of diagnostics.

The seventh category of activities is "Fun and entertaining tasks". It allows students to take time out and relax during class hours or after-school. These tasks are not many, but they are always well received by the children who have much fun.

All resources have their place in the overall teaching and learning. They are a very important addition to the textbook because they enhance and enrich each topic, which allows students to gain more information and hands-on experience. ER also facilitate the diversification and personalisation of work in both class and after-school activities. Therefore, students in pedagogy need to know them and be able to make full use of them.

4. CONCLUSION

What are the main conclusions and recommendations of the survey? The proposed methodological model for training student in pedagogy on the use of electronic resources in technology education at primary school presents an option for enhancing the instruction of students. The more important conclusions that can be drawn are:

- Preparing future teachers to use electronic resources is particularly needed. The investment in devices and technology is not efficient if there is no experience and training
- Detailed planning and precise identification of the place and role of electronic resources in the lesson is essential to achieve the expected results
- Often students are better at technology. This means that teachers must be well prepared or at least have the ability to create opportunities for students to demonstrate their abilities
- One-off training is not enough. Teachers need continuous development to be able to evaluate and select the most appropriate resources. The mastery and use of good pedagogical practices should be considered as more important than the mere technical mastery of ICT.

The model is yet to be refined and developed in future teaching and research work. It will cover such a period as to allow reliable feedback on the effectiveness of the model and its opportunities for implementation in the context of university education in Bulgaria.

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