

ELECTRONIC RESOURCES IN (PRIMARY) EDUCATION: RESEARCH AND APPLIED PERSPECTIVES

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Abstract: The paper presents a theoretical study of the pedagogical phenomenon electronic resources. The research orientation is in the field of primary education, but many of the research findings refer and are common to all school stages. Various aspects of the phenomenon „educational e-resources“ are explored which concern not only clarifying its nature, but also classifying the main types of e-resources and presenting the benefits and limitations of e-resources in education. A key facet of the study is the quality of e-resources and the criteria for its evaluation, but the main emphasis is placed on the necessary competences of teachers in 21st century to work with e-resources. As such, the competences for effective selection and critical assessment of ready-made e-resources are derived, complemented by the competences for adaptation and modification of e-resources. In conclusion, a need to update the curricula for training programmes of prospective primary teachers is outlined and questions for future research are raised.

Keywords: educational electronic resources; digital resources; quality of e-resources; teachers' competences for selecting, modifying and applying e-resources

ЕЛЕКТРОННИ РЕСУРСИ В (НАЧАЛНОТО) ОБРАЗОВАНИЕ: ИЗСЛЕДОВАТЕЛСКИ И ПРИЛОЖНИ ПЕРСПЕКТИВИ

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Резюме: Статията представя теоретично проучване на електронните ресурси като педагогически феномен. Изследователският фокус е в областта на началното училищно образование, но голяма част от научните резултати се отнасят и към останалите етапи на училищното образование. Изследвани са различни аспекти на феномена „образователни е-ресурси“, свързани не само с изясняване на същността му, но и с класифициране на различните видове е-ресурси и представяне на възможностите и ограниченията на е-ресурсите в обучението. Ключов аспект на изследването е качеството на е-ресурсите и

критериите за неговото оценяване, но основният акцент е поставен върху необходимите компетентности на учителите от 21-ви век за работа с е-ресурси. Като такива са изведени компетентностите за ефективен избор и критична оценка на готови е-ресурси, които се допълват от компетентностите за адаптиране и модифициране на е-ресурси. В заключение е очертана необходимостта от актуализиране на учебните планове и програми за обучение на бъдещите начални учители в контекста на тези компетентности и са поставени въпроси за бъдещи изследвания.

Ключови думи: електронни образователни ресурси; дигитални ресурси; качество на е-ресурсите; компетентности на учителите за избор, модифициране и използване на е-ресурси

INTRODUCTION

In the century of digital transformation (21st century), albeit at a slow pace, the digitalization of education and educational institutions nationally and globally has now become an irreversible process affecting all aspects of educational field. This process is currently extremely accelerated due to the circumstances imposed by the Covid-19 pandemic, and probably it will soon change the educational reality completely. Digitalization has both administrative and pedagogical aspects, but there is a lack of regulations for its specific implementation and application of its individual components which could affect its quality. One of the tools for digitalization of educational processes are electronic educational resources – they are also one of the most dynamically transforming components of the educational process. Although electronic resources (e-resources) have long been present in Bulgarian classrooms, their nature, characteristics, specifics, relevance of the application in education and the necessary competences for their effective use and creation are not well studied yet.

Research on the e-resources in the literature reveals various aspects of this phenomenon, some of which are dominant, namely: pedagogical aspects; technological aspects; psychological aspects; accessibility aspects; ergonomic and aesthetical aspects. The study of each of these aspects is a separate, extensive research topic. For example, the accessibility is related to the education of SEN students which is a very broad research area. Not only the accessibility aspect, but all the above mentioned aspects are separate research areas and each of them can also be rediscovered in different theoretical fields. Therefore, it has to be clarified that the dominant focus in this research is on the pedagogical aspect of e-resources.

E-RESOURCES AS A PEDAGOGICAL PHENOMENON

There are different approaches for defining and classifying e-resources, as well as educational resources as a whole. Both traditional (nonelectronic) and electronic educational resources are supporting the main learning activities, but unlike the traditional ones, e-resources are dynamic and changing – they can provide up-to-date learning content much faster. Furthermore, different technologies could provide diverse presentation of learning content and it is well established in the literature that if a teacher uses various sources to present the learning content (such as multimedia and interactive resources), the learning process could be significantly improved by “providing a flexible learning experience that is tailored to the various needs and preferences of the students” (Racheva, 2018: 020032-4).

In a number of studies, the term „digital resources“ is used instead of „electronic resources“ but yet in the literature there is no exact definition of the difference between the terms „electronic“ and „digital“. Generally, „electronic“ is a broader concept than „digital“. Considering that the European Framework for Digital Competences of Educators (Redecker, 2017) refers to digital resources, meaning „any content published in a computer-readable format“, the term electronic resource is used as a synonym of the term digital resource. The term electronic resource was chosen here with respect to its broader definition and terms such as „electronic textbook“, „electronic aids“ etc. that have already been present in Bulgarian educational system. In the pedagogical literature, e-resources are described with various terms and concepts, for example: computer teaching aids, pedagogical software, educational-computer programs, electronic teaching aids, educational electronic publications (as well as digital and e-resources). Based on their definitions, the concept of an electronic resource for education, which is used in the current paper is derived as: *e-resources are resources that require access to a computer or other digital source and are used for educational purposes*, i.e. used by teachers to support teaching, learning and pedagogical communication.

As it was already mentioned, in the literature there are different approaches for classifying e-resources according to different criteria related to certain features. Some of these classifications are also valid for traditional resources. Table №1 below presents two of the most popular classifications – the first is a classification according to educational objectives based on Bloom’s taxonomy, which is generally valid for conventional resources. A more detailed definition of this classification in terms of e-resources based on Bloom’s updated digital taxonomy (Churches, 2008) and Carrington’s Pedagogical Wheel (2016) is published in the monographic book “Electronic resources in primary education” (Aleksieva, 2019a). The second classification is according to the type of technology used and it refers specifically to e-resources. In the framework of theoretical and empirical research, described in details in the abovementioned book, it was found that according to the technology through which they are developed, the most commonly used e-resources by Bulgarian teachers are grouped in five main categories.

According to educational objectives:	According to technology used:
e-resources for remembering and understanding the learning content; e-resources for applying knowledge; e-resources for analysing and creating learning content; e-resources for evaluation.	electronic textbooks; educational websites and applications; WEB 2.0 sharing technologies; specialized educational software; software for creating educational resources (e.g. MS PowerPoint, MS Sway etc.).

Table 1. Types of e-resources

It is well recognised that using e-resources have a potential to improve education – even in European Parliament Report on new technologies and open educational resources (2014) is noted that such resources “create opportunities for both individuals, such as teachers, students, pupils and learners of all ages, and educational and training institutions to teach and learn in innovative ways”. Certainly, the scientific literature also explores the specific benefits and limitations of e-resources. Some *benefits* which are proven as such in many empirical research (White & Manton, 2011; Ahiazu, 2012; Reddy and Mishra, 2003) and are confirmed in my own professional experience and the experience of other educators are presented below. These are e-resources’: interactivity; opportunities for providing accessibility and differentiation in education; up-to-date information; as well as their contribution to development of additional skills for working with ICT. It should be noted that all these benefits are potential, as they cannot exist outside a specific pedagogical context. They are opportunities that can be realized and have pedagogical value only when they are contextualized, i.e. they are implemented with a specific educational purpose, for a specific audience, etc. On the other hand, *limitations* of e-resources are dominantly perceived as technological aspects such as accessibility, high costs of technology, lack of technological competence to use electronic resources (Berzins & Hudson, 2011; Ashikuzzaman, 2016), and very rarely in the literature purely pedagogical limitations are mentioned. Although diverse opinions could be found on the educational potential of e-resources, the scientific literature in this area demonstrates their undeniable benefits as tools for better illustrating the learning content and increasing students’ motivation to learn (Racheva, 2018; Terzieva et al., 2018; Aleksieva, 2019b).

When discussing the potential benefits of e-resources, the matter of their *quality* cannot be left aside. Their quality, as the e-resources phenomenon itself, is analysed in various dimensions and aspects (pedagogical, technological, psychological, accessibility ergonomic and aesthetical aspects). These aspects also interact – the quality of e-resources, especially from a technological point of view, greatly contributes to the pedagogical quality of e-resources. The same applies to aesthetical, ergonomic, etc. aspects of the quality. These aspects apply to the quality of all types of e-resources, used in business or education, but in

the context of pedagogical usability or suitability, the problem of the quality of electronic resources cannot be ignored and it occupies a central position. The pedagogical quality of electronic (and also of traditional) resources is related to the extent to which the respective resource contributes to the implementation of the educational objectives. In this respect, the pedagogical aspects of the quality of e-resources can be distinguished as a separate field of research, but all other aspects of e-resources, especially technological, ergonomic and aesthetical, also contribute to their quality, as the low quality in relation to these aspects can affect negatively on the process of perception of learning content and even on the health of the learners. Therefore, these aspects are seriously researched, defined and grouped in different quality standards such as WCAG 2.1 (i.e. Web Content Accessibility Guidelines), the international e-courseware quality certificate EPPROBATE, as well as the quality standards for e-resources, which Sofia University adopted in 2015. These standards and certificates are applied mainly for educational purposes. Based on them, as well as on various studies in the field of perception of learning content by primary school students, in the abovementioned book (Aleksieva, 2019a) criteria for assessing the quality of e-resources intended for primary education are derived. These assessment criteria consist of separate indicators, localized in three main groups - 1) criteria related to the learning content; 2) usability criteria (both pedagogical and technological); 3) criteria for visual and multimedia design. These groups of criteria combine different aspects of quality (pedagogical, technological, ergonomic, aesthetical, psychological and accessibility aspects). In another monographic study, a model for teaching mathematics through educational multimedia is proposed, which integrates the specific requirements for multimedia resources intended for teaching in primary school in terms of pedagogical design and technological aspects (Aleksieva, 2019b). These studies as well as the different quality standards emphasise the importance of quality of e-resources in its various aspects which is a key factor for realizing e-resources potential benefits.

TEACHERS COMPETENCES

All the advantages of e-resources that were mentioned can only become real when quality is ensured, but especially when teachers use them appropriately, in an adequate pedagogical context for the implementation of relevant learning objectives. A technology (in this case e-resources) is just a tool that would be completely ineffective if not used properly by teachers. Yet in order to do so, they must have certain competences. That is why in the educational e-resources research context, one of the most important topics is that of teachers' competences, which focuses on three main aspects – competences to use e-resources, competences to adapt e-resources and competences to create such. When we consider the digital competences of teachers, however, we do

not only mean their skills to create and use relevant resources, but also to be able, firstly, to create quality e-resources, and secondly, to critically assess the quality of e-resources used in order to achieve the relevant learning goals. This demonstrates the presence and the importance of the quality of e-resources at all levels.

Considering that the majority of currently working teachers have not completed their education in the last five years, it is very likely that at the time of acquiring their pedagogical qualifications there was a lack of preparation for working with e-resources. There are still various formal and informal ways in which such preparation can be provided, as it is highlighted in the results of a national research on the state of ICT integration in the Bulgarian schools that „the responsibility for quality of technology integration in Bulgarian schools is much more on the continuing teacher training system than on the training of future teachers in higher education“ (Peytcheva-Forsyth, 2012: 117). The rapid pace of technology development also imposes the need for permanent qualification of teachers.

In fact, the idea for teachers' competences related to e-resources has historically greatly evolved. In the last century there was not enough quantity and also quality of e-resources created (and shared), and the teachers mainly relied on the mastering the technology themselves in order to create their own resources. At the moment, the tendency is at the other extreme – teachers are rather using ready-made e-resources than creating them, although the opportunity to adapt ready-made resources is present, as well as creating and sharing them. If at the end of the last century the main issue was that teachers are extremely busy to create resources on their own, now when this is no longer a necessity, other issues related to this competence emerged. **The emphasis is now on teachers' competences in selecting and critically evaluating electronic resources.**

In the European Parliament Report (2014) it is recognized that educational institutions have the opportunity to choose individual resources and modify them according to their specific needs, paying attention that although “a „digital native“ generation is fast emerging, today's educators must be *properly trained* to embed ICT in their pedagogical practices”. The report also urges the European Union members to support the professional development of teachers in the field of ICT by “offering them modern curricula in their initial education, and by providing them with in-service training geared to equip them with the necessary competences for the use of digitally supported teaching methods”. This document stresses on the need of adequate training of teachers, highlighting two aspects of working with electronic resources – their direct usage and their adaptation. Both types of activities require specific competences, and the third aspect – creation of electronic resources requires additional competences.

Competences related to the creation and use of electronic resources are one of the core digital competences of teachers in the 21st century. These competences find their place in a wider range of competences, which are called digital competences of educators and are defined in the European Framework for the Digital Competence of Educators (DigCompEdu), (Redecker, 2017). This framework for educators' digital competences is based on the European Digital Competence Framework for Citizens (DigComp), (Carretero, Vuorikari, & Punie, 2017), and includes educators' professional competences, pedagogic competences and learner-related competences. The competences related to digital resources are localised in the pedagogical competences and they are grouped in the following categories:

- competences for selecting digital resources;
- competences for creating and modifying digital resources;
- competences for managing, protecting and sharing digital resources;

The framework presents the main content of the three categories of competences, and as it became evident, one of the main priorities of the 21st century is the first competence – for selecting appropriate digital resources. In general, it includes the identification, access and selection of digital resources for teaching and learning, taking into account the specific educational objectives, context, pedagogical approach and educational learning level and specifics of learners. The reliability and authenticity of e-resources, as well as their pedagogical usability are critically assessed. The competence for selecting appropriate digital resources intertwines technological competences that are related to digital literacy and pedagogical and methodological competences that are related to the pedagogical training of teachers, in order to build the skills for critical assessment of e-resources (see Figure 1). Taking into account the wide variety of e-resources available, each teacher needs to develop qualities that would help him/her identifying effective e-resources according to educational objectives and specifics of learners, and appropriately modifying resources to support learning.

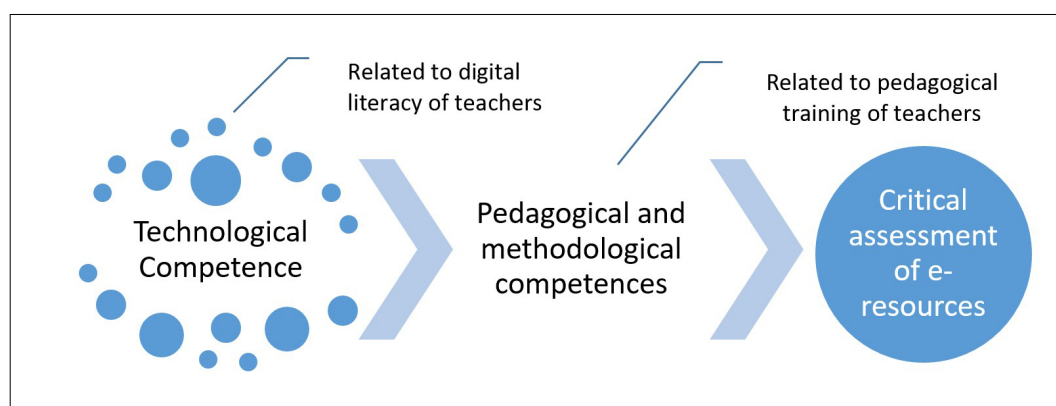


Figure 1. Components of competence for selecting e-resources

Recently published teachers' competence model for working with e-resources examines particularly the manifestations of competences for effective selection and use of electronic resources, as well as the competences for modifying and creating electronic resources (Aleksieva, 2019a). It also clearly reveals that the skills for critical assessment of the quality of electronic resources in pedagogical context occupy the main part of the competences for effective selection of e-resources. However, there is a serious gap in the literature regarding competences of teachers related to the use of electronic resources not only in Bulgaria but worldwide. Several studies in Bulgaria have posed research questions related to the attitudes and experience of primary teachers in terms of working with e-resources, which results demonstrate that, in general, teachers have a desire and a positive attitude to work with e-resources (Aleksieva, 2013; 2019a; 2019b; Terzieva et al., 2016), but also there are some negative results in terms of teachers' motivation to create e-resources (Karabov et al., 2018). Regarding their competences for selecting and modifying e-resources, results of a recent study (Aleksieva, 2019a) of almost 500 Bulgarian primary school teachers, reveals that the majority of them believe that they have such competences, but mostly at an intermediate level. Many of them consider themselves familiar with the pedagogical, ergonomic and aesthetical requirements for the quality of e-resources to a certain degree, but at the same time they recognize their need for additional training, especially in the field of pedagogical and methodological requirements for using e-resources in their classes. An important finding of the abovementioned study related to teacher training is that 95% of the teachers-respondents believe that their higher education should involve training for developing competences for working with e-resources, reflecting the specifics in each school subject. This finding impose the need of improvement of the curricula and programmes for university training of prospective primary teachers, but still, there is an obvious necessity of further empirical researches in terms of identifying deficits in teachers' competences in order to plan and implement such improvements.

CONCLUSIONS AND PERSPECTIVES

Educational e-resources are emerging as a multidimensional pedagogical phenomenon with many potential benefits. The main factors for the successful use of e-resources for educational purposes which leads to manifestation of their potential benefits, are the *quality* of e-resources (again in a multi-layered dimension) and the competences of teachers for their effective selection, adaptation and usage. Necessary teachers' *competences* are a dynamic concept that is evolving according to the current technologies and teachers' access to ready-made e-resources. Taking into consideration the rapid pace of technology development and the provision of many free e-resources due to web based sharing technologies in 21st century, there is a clear and progressive need to build teachers'

competences for effective selection and critical assessment of e-resources. There is also an urgent necessity to expand the university education in the disciplines, related to teaching individual school subjects to provide teachers the opportunity to master the necessary competences for teaching effectively using e-resources, with an emphasis on the respective pedagogical requirements. This is also related to the necessity of updating the curricula of students-prospective teachers through inclusion of a wider range of elective courses to provide additional training for working with electronic resources. Within the university preparation of prospective teachers, and especially in the disciplines offering training related to the use of ICT, they should get acquainted with the criteria for the quality of electronic resources, with an emphasis on pedagogical and technological criteria.

This paper raises some questions for future work, mainly related to the development of quality teacher training programmes which provide competences for selecting, modifying and adapting e-resources according to relevant educational objectives, that can be constantly updated regarding the emerging technologies. The development of such programmes is associated with an in-depth study of the existing competences of teachers, their current practices and their results, as well as with the development of unitary criteria for the quality of e-learning resources.

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