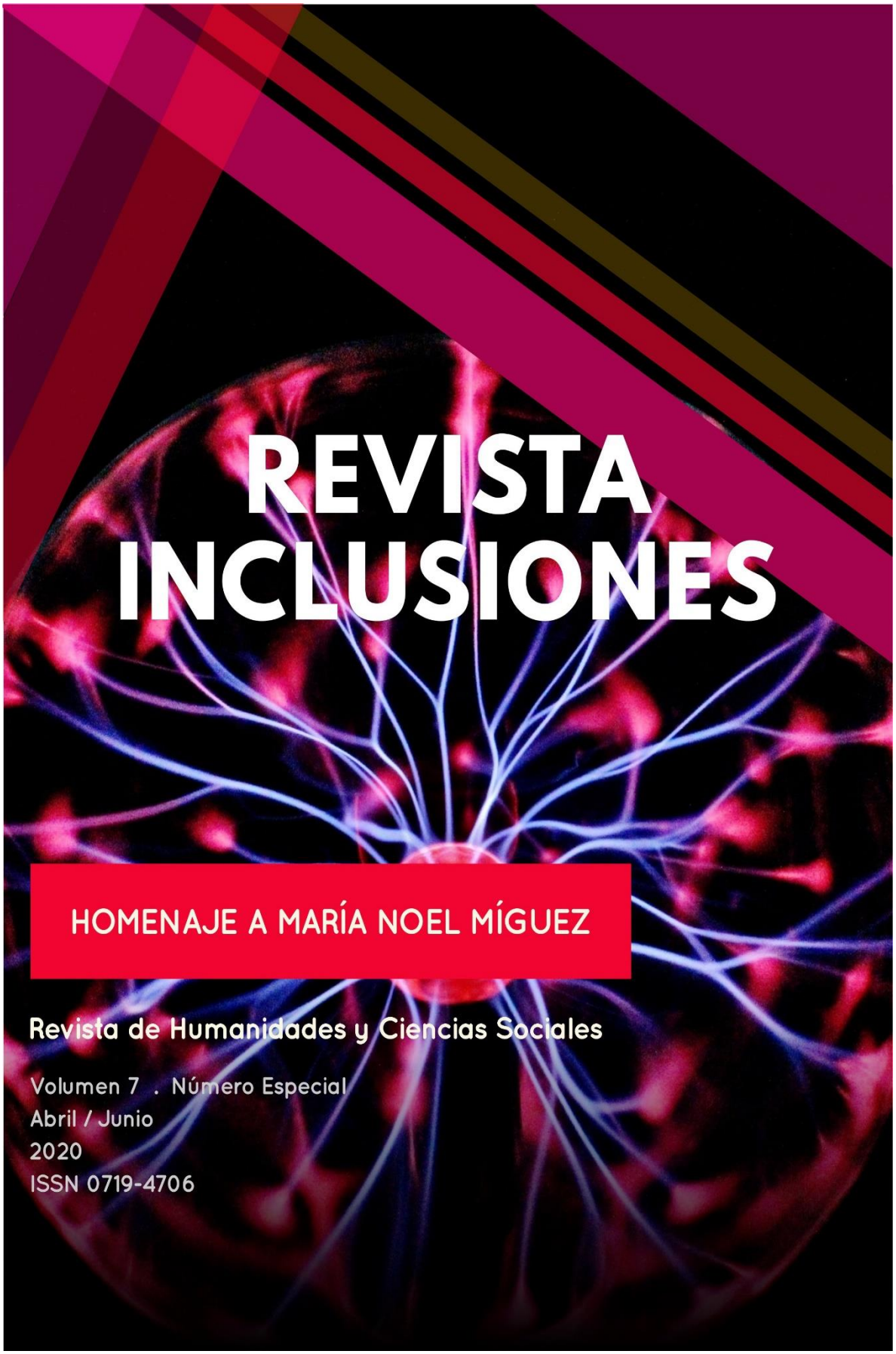

REVISTA INCLUSIONES

HOMENAJE A MARÍA NOEL MÍGUEZ

Revista de Humanidades y Ciencias Sociales

Volumen 7 . Número Especial
Abril / Junio
2020
ISSN 0719-4706

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ISSN 0719-4706 - Volumen 7 / Número Especial / Abril – Junio 2020 pp. 173-204

DIGITAL DIDACTICS AS A NEW MODEL IN THE THEORY OF EDUCATION

Ph. D. Olena Sagan
Kherson State University, Ukraine
ORCID ID: https://orcid.org/ 0000-0002-3195-3686
evsagan777@gmail.com
Dr. SvitlanaYakovleva
Kherson State University, Kherson, Ukraine
ORCID ID: https://orcid.org/ 0000-0001-7620-098X
cdyakovleva@gmail.com
Ph. D. (C) Elena Anisimova
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ORCID ID: https://orcid.org/ 0000-0001-9467-3975
anisimova_7@ukr.net
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Kherson State University, Kherson
ORCID ID: https://orcid.org/0000-0003-4256-5758
timoshkovaalena@gmail.com
Lic. Halyna Yeremenko
Kherson State University, Kherson, Ukraine
ORCID ID: https://orcid.org/0000-0003-0009-2913
yeremenkogalina@gmail.com

Fecha de Recepción: 01 de febrero de 2020 – **Fecha Revisión**: 09 de febrero de 2020

Fecha de Aceptación: 01 de marzo de 2020 – **Fecha de Publicación**: 01 de abril de 2020

Abstract

Rapid changes in society connected with the qualitative transformation of informational and educational environment provoke the study and development of a new tendency in pedagogics, in particular in the theory of education. The article explains the necessity of transition to a new digital model of didactics, suggests its structure and approaches to its realization. The author's vision of new principles, methods, means and forms of organization of modern education are presented in the article. The study of the level of teachers' awareness of digital didactics principles and their real readiness to work in the conditions of informational educational environment has shown a low level of the formation of corresponding competences among teachers. As teacher's qualities are transformed due to the transition from teaching to engineering of educational activity, the article states the main e-teacher's qualities: informational resources analyst, content designer and designer of education and evaluation methods. Their formation helps to realize e-didactics idea, in which educational resource is a system-forming element. Given e-didactics structure illustrates the way educational resource can serve as content, tasks for the formation of corresponding competences and means of control of education quality. Padagogy Wheel is considered to be a means of web-resources selection for any level of knowledge. Teachers' questionnaire has shown that their knowledge, skills and will to use web-resources (for example, Padagogy Wheel) in the organization of educational activity is at 30 % mark that requires considerable attention of pedagogical community. One of the ways of solving this problem consists in the creation and extensive testing of open educational resources dedicated to implementation of digital didactics.

Keywords

Digitaldidactics – Digitalcompetence – Educational resource – E-teacher qualitie
Padagogy Wheel

Para Citar este Artículo:

Sagan, Olena; Yakovleva, Svitlana; Anisimova, Elena; Balokha, Alona y Yeremenko, Halyna. Digital didactics as a new model in the theory of education. Revista Inclusiones Vol: 7 num Especial (2020): 193-204.

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Introduction

Rapid development of information and communicative technologies has changed modern human's life: since preschool age the use of the priorities of "intelligent" space organization, mobile apps up to the selection of open educational resources and participation in scientific applied researches based on crowdsourcing and crowdfunding principles.

All-life education, the ability to adapt to changing outer circumstances, to form and improve your own digital competence have become the main conditions of achieving success in 21 century.

The analysis of works in the sphere of andragogy has proved that one of the most passive categories of specialists who use informative and communicative technologies effectively is represented by teachers. Traditional approaches in education do not agree with the challenges formulated on the state level and for each particular student. The triad Teacher-Student-Content is rapidly declining as there are a lot of information sources which help to get new knowledge and displace the Teacher unwilling to modify his activity. This article is focused on the given problem and effective ways of its solving.

Literature review

The basis of pedagogical knowledge for both a school teacher and university professor is didactics as a science that studies education problems and reveals the regularities of knowledge and skills assimilation, opinion formation. It was didactics that for centuries served as a foundation for teacher's mastery. The traditional scheme of knowledge transmission from teacher to student was transformed due to the appearance of new channels of content transmission. The invention of computer at the end of 20th century gave the humanity new means of education; today scientists proclaim the formation of a new phenomenon: information and communicative educational environment, in which classical pedagogical principles, forms and methods are transformed under the impact of this environment. The theory of education in modern conditions gets new content and name – digital didactics. So, M. Choshanov[1] defines it as a science about the art of effective learning with a wide use of digital technologies and multimedia means. L. Belyaieva[2] interprets digital didactics as a process of education connected with the development of the Internet, realization of activity approach, implementation of open education and other technological innovations oriented on the school of future.

V. Monakhov[3] and his followers distinguish digital didactics as a strategically important innovational approach to a modern theory of education that is proceeding to

[1] Murat Choshanov, "E-didactics: A new look at the theory of learning in the digital age", Educational technology and society. Moscow Vol: 4 (2013): 684-696. Retrieved from: https://cyberlenink a.ru/article/v/e-didaktika-novyy-vzglyad-na-teoriyu-obucheniya-v-epohu-tsifrovyh-tehnologiy

[2] Lubov Belyaeva, "Digital didactics". Khabarovsk, Khabarovsk Regional Institute for the Development of Education, 2019. Retrieved from: http://1forumpedagogovdfo.tilda.ws/digital_didactics

[3] Monakhov Vadim, School of V. Monakhov, 2019. [online]. Retrieved from: http://www.instrao.ru/images/1Treshka/Nauchnye_shkoli/Monahov/Avtorskaya_shkola_VM_Monakhova_Strategi_191117.pdf

function and develop together with digital technologies, interpreting and using all recently created electronic, technical and technological achievements in the sphere of computers and digital technologies in the present period of formation of information educational environment.

O. Ospennikova[4] considers multimedia electronic didactics as a theory of education in a wide communicatory environment on the basis of use of various means of information transmission.

The scientist states essential differences between pedagogics that uses multimedia and pedagogics formed on new principles of functioning in information and communicative environment.

This type of pedagogics should be based on partner relations between students and teachers, using their inner motivation and combining knowledge, pedagogy and technologies that change the system[5].

In this context intellectual demands of students can be satisfied by teachers with an adequate level of digital competence formation. V. Bykov, N. Morze, O. Ovcharuk, O. Sagan[6], E. Smyrnova-Trybulska[7], O. Spirin, etc. dedicated their researches to this problem.

Proposed methodology

In the process of investigation such theoretical methods were used: analysis and synthesis of Ukrainian and European scientific resources; comparison of structural elements of classical ad digital didactics; questioning of higher educational establishment teachers, school teachers; analysis of the obtained results. While carring outnetnographical research, we have used the method of studying of web-sites of Ukrainian universities that train future teachers.

Result analysis

We propose our own definition of digital didactics as a part of pedagogics that studies principles, methods, means and organizational forms of education in informational educational environment. Structural components of the following phenomenon are presented in Fig.1.

[4] E. Osppennikova, E. “E-Didactics of Multimedia: Problems and Research Directions”. BULLETIN OF THE PERM STATE HUMANITARIAN-PEDAGOGICAL UNIVERSITY. Vol:4(2005): 16-30.Retrieved from: https://cyberleninka.ru/article/n/e-didaktika-multimedia-problemy-i-napravleniya-issledovaniya

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[6] Olena V Sagan, Maryna S Haran, Oksana M Liba, “Formation of the methodical-informatic competence of primary school teachers”, Information Technologies and Learning Tools Vol: 65 num 3 (2018): 304-315.

[7] Smyrnova–Trybulska, E. Technologie informacyjno-komunikacyjne i e-learning we współczesnej edukacji (Katowice: Wydawnictwo Uniwersytetu Śląskieg, 2019).

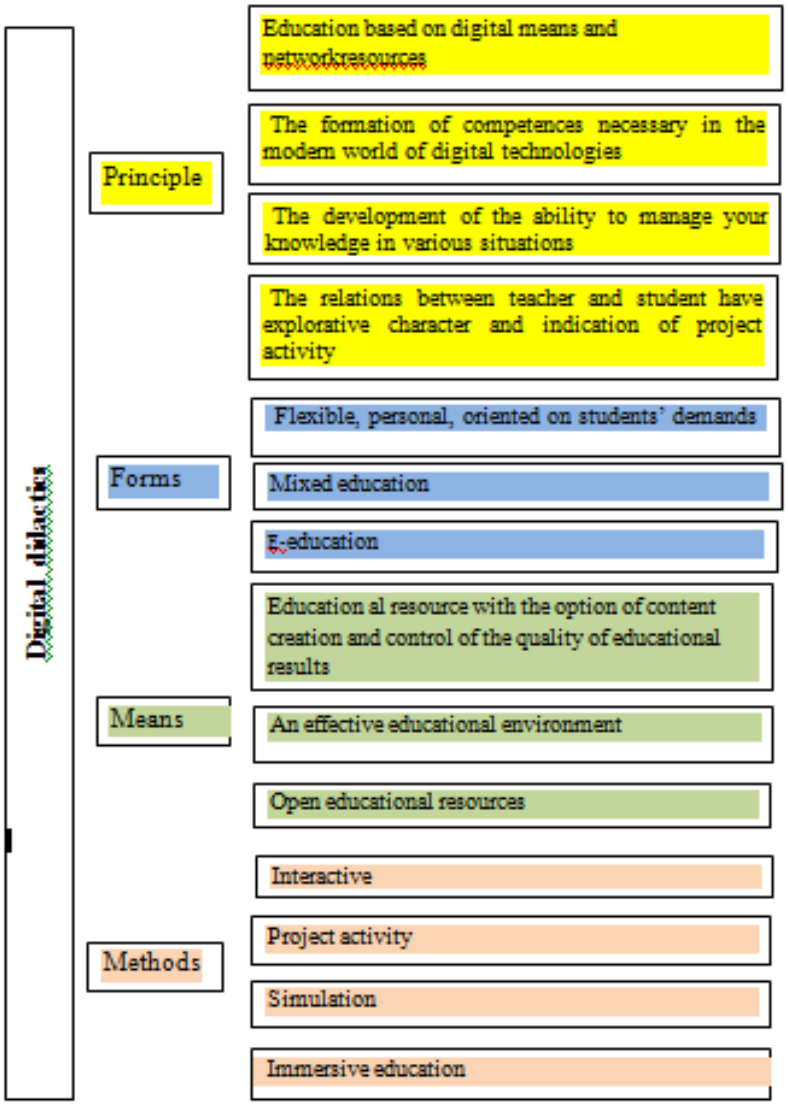

Figure1
Structural components of digital didactics

We did survey of 127 Ukrainian university and college teachers to define the level of teachers' awareness of the principles of digital didactics and their real readiness to work in the conditions of informational educational environment.

While creating questionnaire we followed UNESCO[8] committee recommendations about necessary teachers' competences in digital epoch (Fig.2). Within e-didactics the following levels of digital competence formation were defined: low, average, high. Low level is characterized by a spontaneous use of informational and communicative

[8] UNESCO. UNESCO Competency Framework for Teachers. UNESCO. Retrieved on June 3, 2013 from: http://www.unesco.org/new/en/unesco/themes/icts/teacher-education/unesco-ict-competency-framework-for-teachers/.

technologies in the educational process. Average level includes education with a wide use of digital technologies and multimedia means. High level implies the use of education management systems to provide e-education.

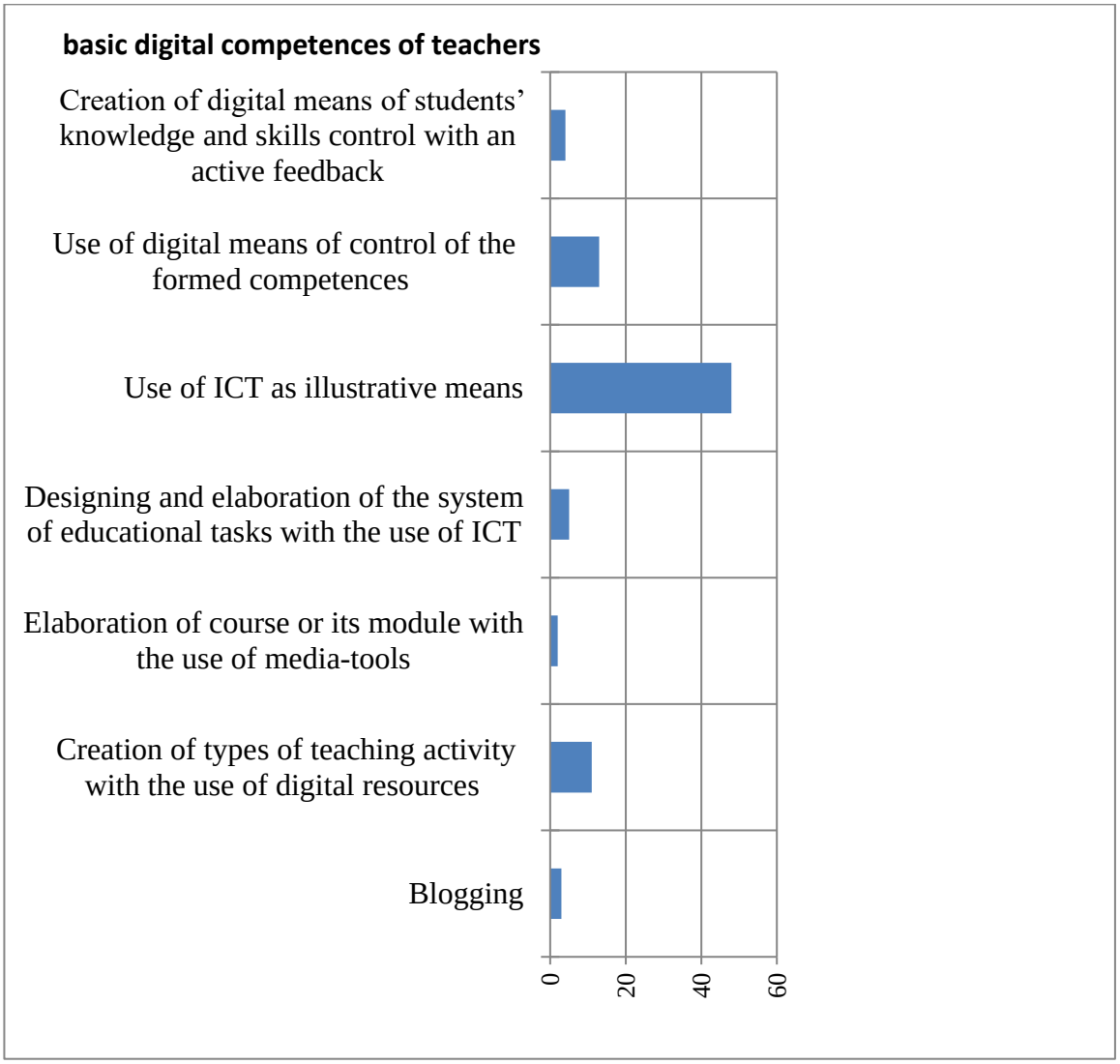

Figure 2
The formation of teachers' basic digital competences in the conditions of e-didactics on the first stage (%)

Thus, according to the questionnaire results, most of the teachers use the opportunities of digital technologies to provide illustrative explanation of the material and demonstration of the models of experimental processes. Among the control methods they mostly use usual tests. Nowadays only 5 % of espondents work at creation and promotion of the effective educational environment with digital content, system of tasks for different levels and high feedback rate. Today not only teachers who are knowledge transmitters, but those who design digital didactic projects directed on the formation of new knowledge, are in demand.

The analysis of the given situation provides the basis for description of qualities of the teacher who uses digital didactics principles.

Firstly, the ability to analyze the flow of informational resources for further elaboration and use is relevant to any specialist in the modern world. Thus, technological control in the conditions of informational educational environment allows teachers to get educational information for methodical improvement of their professional activity.

Secondly, the elaboration and construction of the educational course require such teacher's skills as:

- goal-setting and description of expected educational results on each stage of educational process (course, module, lesson);
- use or creation of the system of educational tasks for different levels: from memorizing and reproduction to the use of analysis, synthesis and evaluation (in our context with a compulsory use of media-tools).

Applying methods of mathematical modeling, a teacher can construct a model of educational process in a form of technological chart, logical structure of managerial and educational processes.

Thirdly, the organization of project activity requires appropriate teacher's competences connected with designing and elaboration of educational methods and effective evaluation. Such a teacher designs not only the model of educational process, but the model of personal system of remedial work according to the results of diagnosis.

Thus, due to the transition from teaching to engineering of teaching activity one can define such maine-teacher's qualities: informational resourcesanalyst, content designer and constructor, designer of education and evaluation methods. The change of qualities implies the change in the types of activity.

Modern formula of educational unit designing (course, module, lesson, etc.) can be presented in the form of scheme (Fig.3).

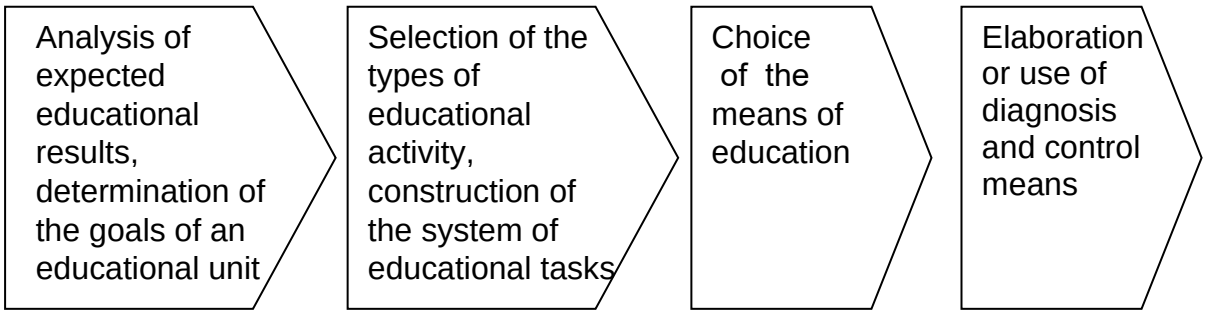

Figure 3
The scheme of designing of an educational unit

According to this, we can present in general the structure of teacher's activity based on digital didactics principles (Fig.4).

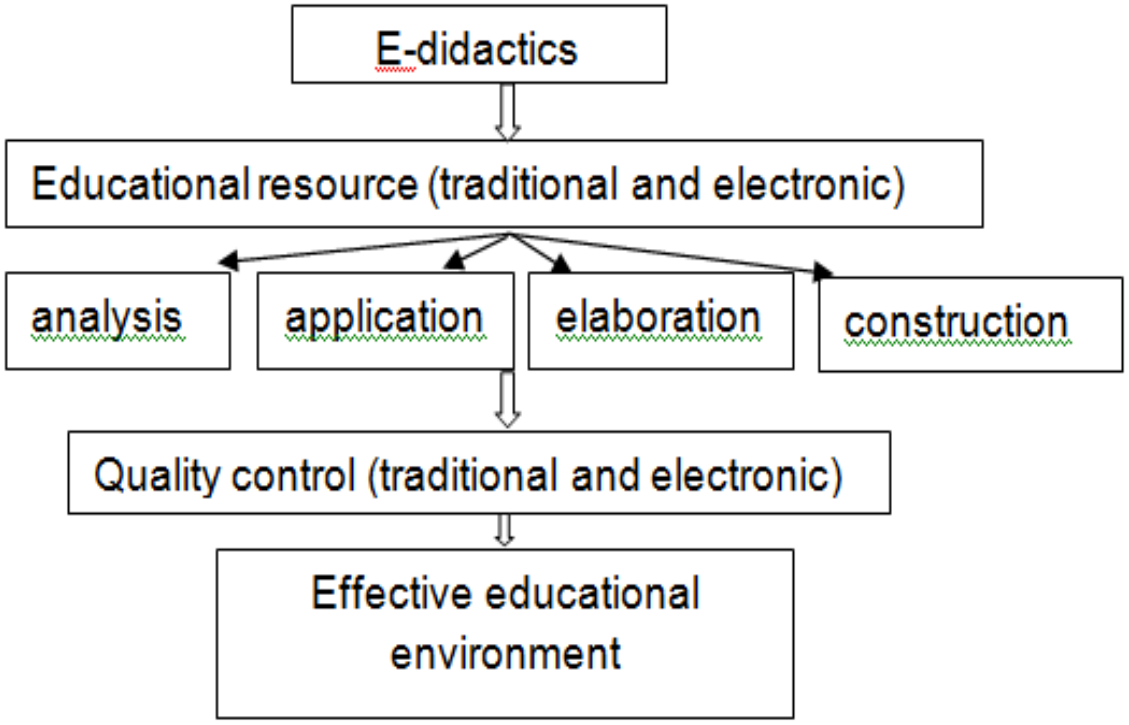

Figure 4
Digital didactics structure

It is obvious, that such structural element of digital didactics as educational resource is system-forming and at the same time dynamic, i.e. rapidly changing. Moreover, in terms of classical didactics educational resource can serve both as a means of education and a tool of educational technology that actualizes the problem of its qualitative application for teachers.

We approve of A. Carrington's[9] approach: having analyzed modern web-apps and the ability of usage of mobile devices in education, applying B. Bloom's modified model (1956) in D. Krathwohl and L. Anderson's adaptation (2001), he elaborated the structure of apps usage for education. This investigation is known as Padagogy Wheel (Fig.5) and, in our opinion, it is the best guide for educational resource selection and organization of a productive education.

Obviously, in updated versions of Padagogy Wheel the apps will be changed and complemented allowing the subjects of educational process to keep up to date and satisfy the demands of the digital epoch.

[9] Allan Carrington, (Ed.), The padagogy Wheel...It's a bloomin' better way to teach. Allan's Blog: In Support of Excellence, http://www.unity.net.au/allansportfolio/edublog/?p=324

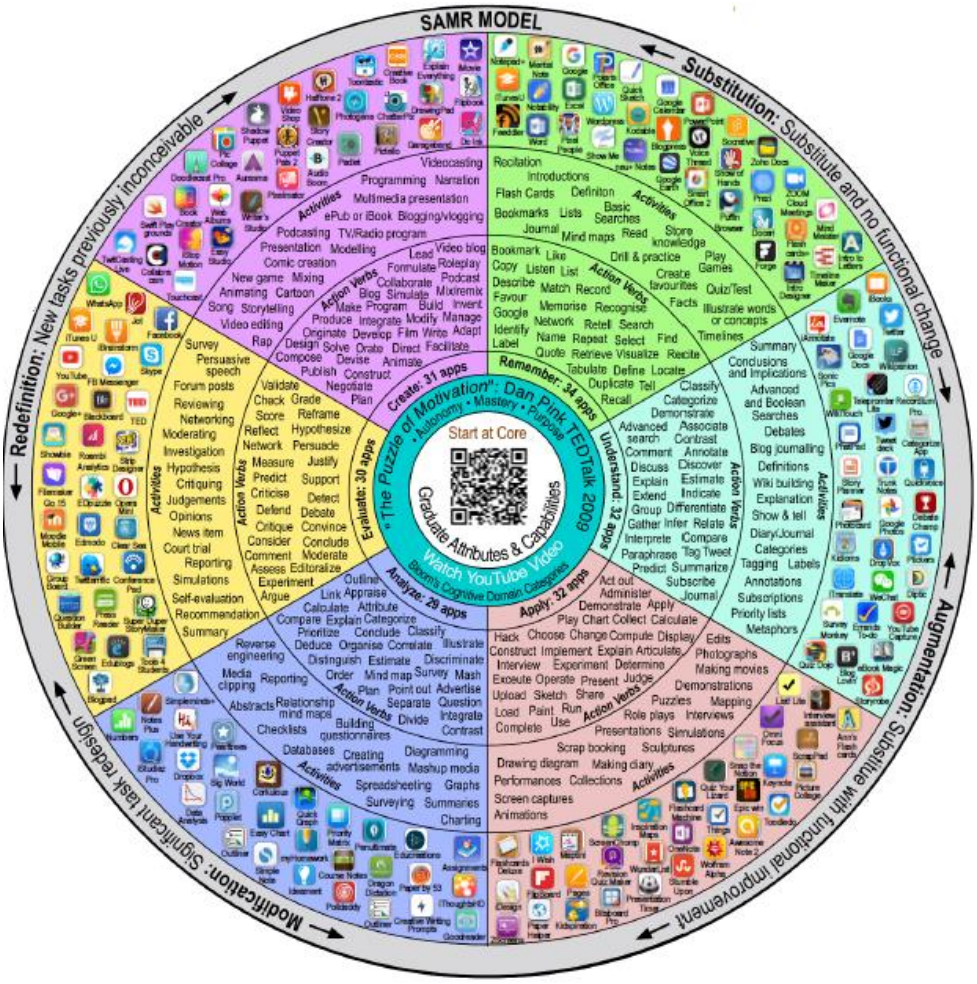

Figure 5
The Padagogy Wheel developed by Allan Carrington[10]

As part of our study, the attention is focused not only on the use of various apps by teachers in educational activity, but on the level of their construction skills to make up tasks of different types (remember, understand, apply, analyze, evaluate, create)[11].

Corresponding questionnaire, the results of which are demonstrated in Fig.6, confirms that more than half of the interviewed teachers have no or low level of knowledge about the availability and opportunities of web-apps that causes their inability and unwillingness to use them in the organization of educational activity.

[10] The Padagogy Wheel by Allan Carrington is licensed under a Creative Commons Attribution-nonCommercial-ShareAlike 4.0 International License. Based on a work at http://tinyurl.com/bloomsblog.

[11] O. Sagan; O. Los; O. Kazannikova y I. Raievska, "A System of Effective Tasks in Blended Learning on the Basis of Bloom"s Taxonomy". In E. Smyrnova-Trybulska (Ed.) E- Learning and STEM Education. „E-Learning". Vol: 11 (2019): 171-187.

Given structure of e-didactics demonstrates the way an educational resource can serve as content, tasks for the formation of corresponding competences and means of control of education quality.

All this necessitate the organization, preparation and further training of teachers who work with different groups: from preschool age to adult students.

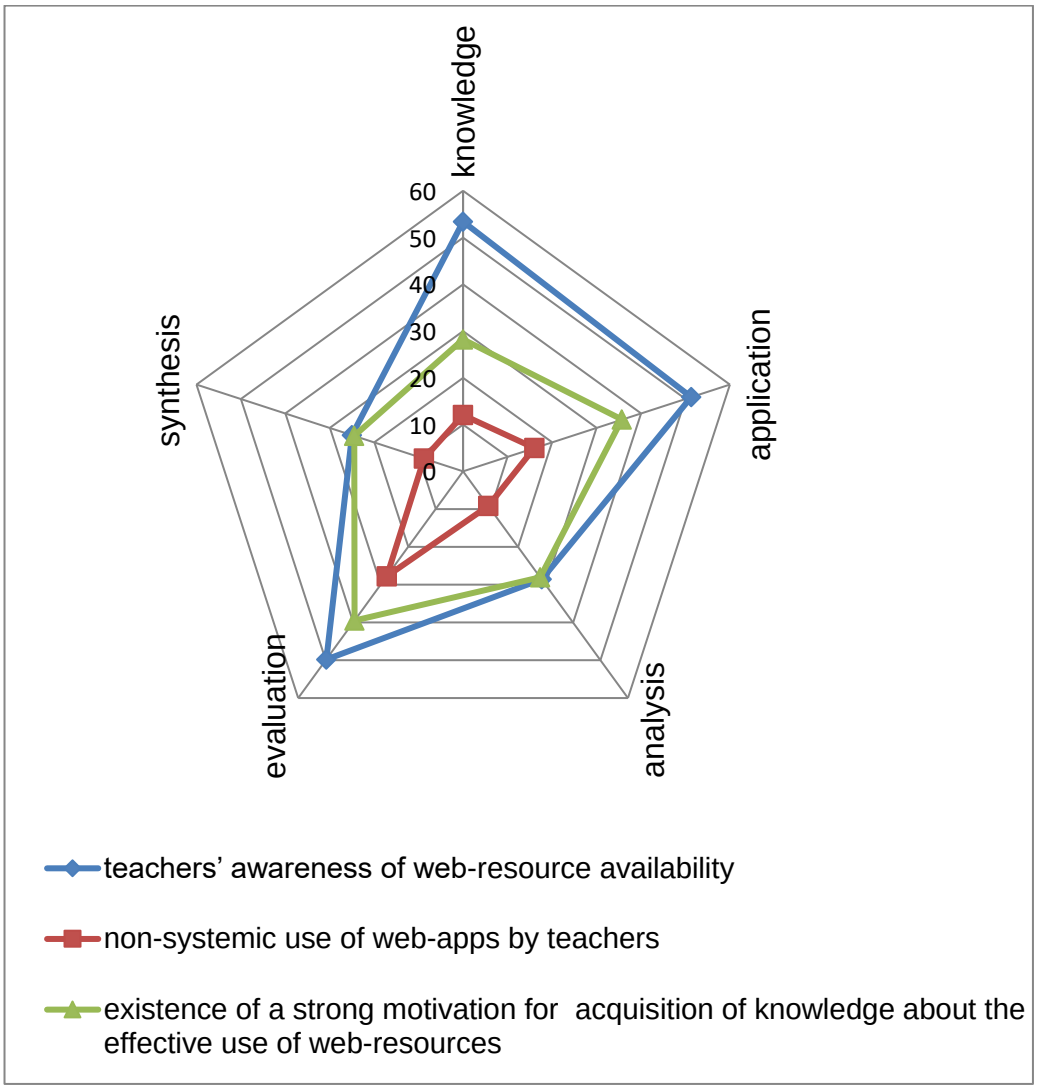

Figure 6
Knowledge, skills and will of teachers to use web-resources in the process of organization of educational activity

Conclusion

The creation of an effective educational environment is a top task of modern education that requires the integration of efforts of teachers, scientists, educational establishments' administrations, state. The transformation of classical didactics into digital one makes relevant a wide range of problems the solving of which is essential nowadays. In our opinion, near-term prospects are connected with the strategy of improvement of the

educational environment (conceptual and procedural aspects); designing of electronic educational environments; creation of an extensive system of forms of communication between all subjects of educational process; creation and support of a web-portal for teachers dedicated to digital didactics promotion.

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