Digital literacy and digital didactics for the development of new learning models

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Abstract

The study aims to investigate digital literacy and digital didactics as the basis for the development of new learning models via comparative qualitative

research methods. As a result, the principle of personalization implies the ability of a student to independently determine the purpose of training, choose a strategy for the educational process, the pace and level of development of the educational program. In conclusion, to determine digital literacy, an index was developed which shows how prepared the teacher is for learning online and through innovation.

Keywords: Education, Teachers, Learning models, Technology.

Alfabetización digital y didáctica digital para el desarrollo de nuevos modelos de aprendizaje

Resumen

El estudio tiene como objetivo investigar la alfabetización digital y la didáctica digital como base para el desarrollo de nuevos modelos de aprendizaje a través de métodos comparativos de investigación cualitativa. Como resultado, el principio de personalización implica la capacidad de un estudiante para determinar de manera independiente el propósito de la capacitación, elegir una estrategia para el proceso educativo, el ritmo y el nivel de desarrollo del programa educativo. En conclusión, para determinar la alfabetización digital, se desarrolló un índice que muestra qué tan preparado está el maestro para aprender en línea y a través de la innovación.

Palabras clave: Educación, Docentes, Modelos de aprendizaje, Tecnología.

1. INTRODUCTION

The global changes in society and education that have taken place over the past 10-15 years as a result of the intensive use of information and communication technologies suggest a revision of the traditional view of didactics. We will examine the evolution of views

on didactics and provide an opportunity to rethink it in the digital age through the prism of integration with engineering. If you go to any school now, you can see such a picture: touch-sensitive electronic boards, televisions, projectors, and computer classes equipped with the latest models, even in the buffets, children pay with a special card on which money is lying. Teachers are not used to ordinary chalkboards, because it is much easier to create an interesting lesson on a computer than to write by hand.

We learn not to iteratively write notes by hand, it is much easier to take a picture of what is on the projector screen. And if someone did not have time to rewrite from the screen, the teacher offers to throw off the e-mail presentation of the lesson/ special sites that have also been developed through which schoolchildren and their parents can monitor grades. They are called electronic diaries, student performance is recorded there, other work is done, if the student misplaced, the student can write to his parents what he has done and discuss it is online. Students also use smartphones to compile lecture materials and take tests online. There is a personal account where they can monitor performance during the semester, there is communication with teachers in the same personal accounts. The world of technology has greatly simplified life for both students and those who teach. All these skills have been defined.

Like a person in any other profession, a teacher must have digital literacy and didactics, that is, basic knowledge, skills, and attitudes necessary for life in a digital society. Already today, in

developed countries, without the proper level of digital literacy, the very fact of employing a person, including a teacher, becomes impossible, not to mention the fact that digital literacy is the foundation for the development of professional ICT competencies. this is knowledge, skills, and attitudes that allow him to freely use ICT to organize the educational process at all its stages — from preparing for classes to creating a digital environment that helps to build individual educational trajectories for students, motivate them to learn, analyze and predict their performance (AINLEY, FRAILLON & SCHULZ, 2013). The definitions of both concepts — digital literacy and the ICT competencies of a teacher — as well as their operationalization, will be presented at the beginning of the relevant sections devoted to the assessment of these phenomena (YAKOVENKO, 2000).

2. METHODOLOGY

Digital literacy- is a set of knowledge, abilities, and skills necessary for life in the modern world. It, like the general literacy of a person, has no profession. The digital literacy of the teacher is the same system of basic knowledge, skills, and attitudes in the field of everyday use of digital technologies, as in people of other professions. However, only the definition of digital literacy is not enough to measure this phenomenon — meaningful operationalization of the concept, the construction of scales for assessment and objective measurement are required. One of the first attempts at such operationalization was the DigEuLit project, implemented in Europe in

2005–2006 (BRANDHOFER & WIESNER, 2018). Digital literacy was then determined through four indicators: computer, information, and visual and media literacy. Later, in 2011, a UNESCO expert approach was published describing digital literacy through a set of skills needed to work with digital media and to process and search for information.

The Russian research communities also have a serious backlog in the study of digital literacy. The first works describe similar knowledge and skills (SHARPLES, ADAMS, FERGUSON, GAVED, MCANDREW, RIENTIES, WELLER & WHITELOCK, 2014). They defined them as information literacy, that is, a person's understanding of the basic ideas of computer science, presentation the role of information technologies in society, the ability to work with information flows/ Later, technocratic studies were published, where much attention was paid to infrastructural, technical indicators and almost did not measure the socio-cultural aspects of digital literacy.

At the same time, the data collection methodology, as a rule, was aimed at an Internet audience and excluded a significant number of citizens for whom the network is not available. In this study, to assess the digital literacy of teachers, the NAFI Analytical Center uses the approach proposed by a group of specialists within the framework of Sam- Mita G20, held in Berlin in April 2017. The approach is based on the assessment of indicators of information, computer, communicative literacy, media literacy and attitude to technology. Each of the listed indicators is evaluated in three aspects: cognitive

(knowledge), technical (skills) and ethical (attitudes) (CHETTY, 2000):

• The cognitive aspect- characterizes how a person evaluates, creates, critically approaches work with information, a computer, media, how he communicates with other users and how he relates to technologies;

• The technical aspect- reflects the ability to find the right information, media, as well as an understanding of how digital devices and new technologies work;

• The ethical aspect- assesses people's attitudes to follow generally accepted standards when using digital environment tools. For example, an understanding of the need to verify the accuracy of the information and its sources, compliance with communication standards on the network, etc.

The main advantage of this approach became decisive for its choice during a detailed study of international experience in this field; it represented the indicators of measuring digital literacy that are formulated based on an analysis of the objective needs of the economy — based on big data and machine learning technologies, vacancies are studied and employers' requirements for digital skills and knowledge are typified candidates (demand-side analysis). At the time of the study, this methodology seems to be the most developed and practice-

oriented, it was the result of the joint work of specialists from around the world.

To determine the level of digital literacy, a special index was developed that can be calculated using the formula. Calculation of the Digital Literacy Index for each of the five dimensions of digital literacy, teachers were offered six judgments (three correct and three incorrect), a total of 6 * 5 = 30 judgments (15 pairs). For each of the 5 dimensions, the proportion of respondents who chose the correct statements is calculated. The index value is calculated as the arithmetic average between the shares of the respondents who answered correctly in 5 areas of digital literacy measurement.

$$\text{Index} = \frac{(\text{Inf},\% + \text{Comp},\% + \text{Media},\% + \text{Comm},\% + \text{Innov},\%)}{5}$$

The index takes values from 0 (if no person in any of the measurements could choose the correct statements) to 100 points. The index of the digital literacy of teachers is 87 out of 100 possible, which is a fairly high indicator. In terms of the components of digital literacy, the lowest value is for the attitude to technological innovation sub-index. This indicator measured knowledge of modern technological trends, skills to work with modern gadgets and applications, and attitudes toward the benefits of technological innovation. The highest level of teachers was demonstrated in information and computer literacy — indicators are 93. and 92, respectively.

Teachers of higher education institutions also demonstrate high levels of knowledge, skills, and attitudes in the field of digital technologies. Work in the system of modern education is impossible without knowledge, skills, and attitudes in all five components of digital literacy. The digital literacy index of university teachers is 88 out of 100 possible. In terms of the components of the digital literacy index of university teachers, the indicator of attitude to technological innovation is presented worst of all, like for school teachers: the component value for university teachers is 78 (REDECKER & PUNIE, 2013).

Digital didactics is a branch pedagogy, a scientific discipline about the organization of the learning process in a digital society. High-quality education is born as a result of the interaction of the lesson and the independent (extracurricular) component of the educational process. A lot of educational practices: cognitive, emotional and value, self-determination, self-realization of a person, subjective, valueological, creative, educational, supplemented by the concept of socio-cultural practice, relevant in the modern information world. The digitalization of the educational process is:

• Modification or rethinking of the existing educational process• Optimal alternation of virtual tools and real production processes in vocational education • Transition from inductive to deductive learning logic

• Development of flexibility to the curriculum and organizational structure through the use of new teaching methods and the organization of educational activities

• Motivation for learning activity and students' independence due to rich virtual reality to support their readiness to solve more complex problems.

• Digital technologies as a means of increasing the attractiveness of professions and vacancies in the labor market (FERRARI, PUNIE & REDECKER, 2012).

The subject of the Concept is the digital didactics of vocational education and training - one of the branches of digital didactics.

Factors affecting the construction of the digital educational process:

➢ New technologies and digital environment

➢ New requirements of the economy for personnel

➢ Digital generation - new students

It is worth figuring out why we need digitalization of education:

Digitalization Goals: A Regional Perspective

•Electronic diary

• Electronic journal

• Student Portfolio

• Teacher Portfolio

• Access to interactive

educational resources

• GIA, USE

• Access to teaching materials (including book fund and media library)

 • Certification of pedagogical employees •

• Work with gifted children,

• Children with disabilities, individual

• Training plans

• Distance learning

Further training Monitoring and ratings Administrative and organizational activities (food, meals, etc.).

Collection of statistics and reports, incl. according to the results of the FCD Education quality control system, Electronic document management Purchasing procedures, tenders, incl. Book supply

Data security (protection of servers and communication channels)

• Social networks, sites

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Blended learning is an educational model that combines traditional approaches and online learning.

Basic principles of blended learning:

1. Personalization: the student himself determines (to one degree or another) where, how and what he will learn.

2. Full assimilation: before moving on to new material, students will fully master the knowledge necessary for this from the previous sections.

3. The environment of high achievements: each student has a high goal to which he aspires, and his educational activity is a conscious movement towards this goal along a certain route.

4. Personal responsibility: students understand that they are responsible for choosing a learning method and the results obtained.

Flipped learning is one of the methodological models of blended learning.

 1. Standard inverted class. Pupils get homework - watching video lectures and reading instructional materials related to the topic of the next lesson. In the lesson, they practice what they have learned, and their teachers have more time to work out / consolidate the topic.

2. Discussion-oriented inverted class

3. Demo Oriented Inverted Class

4. Fake upside-down class

5. Group inverted class

6. Virtual Inverted Class

7. Inverted teacher. Videos created for the upside-down class are created by the students themselves. In this way, they demonstrate their knowledge and skills. This is a game in which the student takes on the role of a teacher, and her goal is to teach the teacher.

Formation and development of universal competencies:

➢ Design and research activities

➢ Management of the full project life cycle: from concept to protection

➢ Work in a distributed team: planning and coordination, communication and interaction

Digital Technologies Used in the Education System Digital technologies are distinguished into the following types:

- Powerpoint

- Video

- Email

- Skype

- Yandex / Google search engine

- File sharing (Yandex-disk)

- Mobile application (of your choice)

- Social network (OK, VK, FB ...)

- Chatbot

The didactic principles of the digital educational process

The main principles of the digital educational process include:

1. principle of dominance;

2. principle of personalization;

3. principle of expediency;

4. principle of flexibility and adaptability;

5. principle of success;

6. principle of training in cooperation and interaction;

3. RESULT

1. The principle of dominance focuses on independent student learning activities in a digital educational environment. The teacher needs to organize the learning process, support and help the student in the learning process.

2. The principle of personalization implies the ability of a student to independently determine the purpose of training, choose a strategy for the educational process, the pace, and level of development of the educational program. This approach will allow the teacher to track personal development indicators and student learning outcomes.

3. The principle of expediency intersects with the traditional didactic principle of purposefulness: in the learning process, the use of only such digital technologies is required that maximize the achievement of goals in the educational process of a particular student. This principle does not imply the use of ineffective pedagogical technologies and means without clearly defined educational goals.

4. The principle of flexibility and adaptability allows you to develop an individual approach depending on the conditions of the digital educational process. The digital educational process allows you to automatically adjust the program for each student, taking into account aspects such as the order, method, and pace of the provision of educational material. Also, this principle takes into account the level and nature of teacher support.

5. The principle of success in learning intersects with the didactic principle of strength and requires the achievement of goals, as well as the full assimilation of knowledge, skills. In the digital educational process, this principle is the final element in

the didactic chain explanation - consolidation - control. Additional academic hours are allocated to consolidate the material, often a full-time meeting of teachers and students is organized. The teacher carefully monitors the optimal ratio of the group and individual forms of consolidation. Digital tools greatly accelerate this process and make it less routine.

6. The principle of training in cooperation and interaction (analogous to the didactic principle of interactivity) requires the construction of the educational process based on active multilateral communication - real and network - between the teacher and the student. This principle involves the use of group forms of network learning.

7. The principle of practical orientation, directly related to the traditional didactic principle of the connection between learning and life, requires a clear adjustment of goals and specific results. To do this, you need to organize:

• Stopping training goals, tasks, and problem situations;

• Practical tasks;

• Consolidation of acquired knowledge in combat conditions, that is, on an existing project or enterprise.

8. The principle of increasing complexity, which correlates with the didactic principle of accessibility, systematicity, and consistency, involves a gradual transition:

• From simple to complex and from complex to simple;

• From general to particular and from particular to general;

• From individual to group and from group to individual and other learning processes.

9. The principle of saturation of the educational environment requires an excess of information resources to build an individual learning strategy. Such redundancy can be realized with the help of a network educational resource - a single educational information environment.

10. The principle of polymodality (multimedia) is a more developed didactic principle of visualization and involves visual, auditory and motor (kinesthetic) methods of perception in the educational process. For this, various devices are used, such as simulators, sensors, simulators, as well as augmented reality tools.

11. The principle of included assessment requires continuous assessment of student success throughout the learning process. Digital technologies provide instant feedback, continuously

transmitting to the teacher the necessary data on the results of the assignment. Thanks to this, the teacher concludes the strengths and weaknesses of the student, allowing him to adjust development scenarios and the closest learning goals directly in the learning process. Thus, digital technologies provide objectivity and transparency of the final assessment of the performance of a task.

4. CONCLUSION

Digital literacy and didactics are very important in the modern world, in the world of technology. Every day new methods are invented and new programs are developed for the easiest learning of knowledge. To determine digital literacy, an index was developed which shows how prepared the teacher is for learning online and through innovation.

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