

УДК 371.321.4

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## ARTIFICIAL INTELLIGENCE IN PRIMARY SCHOOL: NEW OPPORTUNITIES CREATED BY COVID-19

*The idea of using the capabilities of artificial intelligence for the needs of the educational process is not new for modern pedagogy, but its development before the Corona time was rather fragmented. The conditions of the pandemic, self-isolation and protracted quarantine forced to look for new opportunities and forms to continue the educational process in this situation. And here the possibilities of organising the educational process for all levels of education using artificial intelligence came to the fore. **The purpose of this article** is to analyse the forms of using the capabilities of artificial intelligence to organise the educational process for primary school students, that became more active because of the COVID-19 pandemic.*

*The **scientific novelty**: Particular attention is paid to the humanities` teaching in elementary school – the area that has traditionally been considered unsuitable for using artificial intelligence as a method and form of teaching. In the process of writing the article, empirical and theoretical research **methods were used**, that is typical for scientific studies of this kind.*

***As the result**, it can be noted that the Quarantine caused by the COVID-19 pandemic played a favourable role in expanding the range of possibilities for using artificial intelligence in the field of education, even in those areas that were traditionally considered to be unsuitable or non-effective for it due to the peculiarities of educational tasks. During the quarantine period caused by COVID-19, computer and AI became an organic and obligatory participant of the educational process, even in primary school. Many students due to temperament, personal features of character, etc. found this form suitable for them.*

*The study is made as a part of «A Comparative Study on Professional Development of Primary School Teachers in China and South Korea» research program (registration number ZKNUC2017038).*

**Key words:** artificial intelligence; humanities; primary school; quarantine; communication technology.

**Постановка проблеми.** The Coronavirus pandemic turned up to be a real challenge for without the exception every well-established social schemes and models for organising life and human activities. On the one hand, protracted quarantine and self-isolation as a social phenomenon showed the vulnerability of existing medicine, economics, public administration and education as existing systems. However, on the other hand, the need to continue life and work, even in such conditions, led to a sharp appearance or activation of forms that before the Corona were only under development. Currently, there are many programs of artificial intelligence (AI) that help in education, thanks to which students, schoolchildren and teachers get huge benefits. The use of artificial intelligence capabilities in teaching humanitarian disciplines or humanities (in this article under this concept we mean such subjects as music, drawing, manual labor, natural history, languages etc.) is today the subject of discussion among methodologists. Also very controversial is the problem of using artificial intelligence for younger students in primary education institutions.

**Аналіз останніх досліджень і публікацій.** Today, it is possible to identify clearly the issues and problems of teaching methods research that are related to artificial intelligence (AI) as a method and form of providing educational services. They can be presented as following:

– possibility of using artificial intelligence in education or «cyber education» (machine learning) as a pedagogical trend (Wayne Holmes, Maya Bilik, Mark Lieberman, Dob Norton, Charles Fadel, Nil Goksel, Aras Barkurt, Ilka Tuomi etc.) – defend the opinion that in the modern world AI is an organic part of the educational process in particular as a result of all spheres of life digitalization in modern society;

– use of artificial intelligence in teaching exact sciences (mathematics, physics, chemistry, drawing, astronomy, etc.) (Ian Goodfellow, Axler Sheldon, David Morin, Denis Auroux, Andrew Trask, Yoshua Bengio, Aaron Courville etc.) – today is probably the most developed problematics as to AI based education. Since the

exact sciences are the most logical and algometric ones, they became natural basis for testing the idea of using AI in education as a method and form of learning, and also give the most representative result;

- artificial intelligence for secondary and higher education (Niels Pinkwart, Sannyuya Liu, Carin Berg, Keng Siau, Yizhi Ma, Scott Martin etc.) – based on the position that modern adolescents (the age of middle and senior school, as well as students of higher educational institutions) already have collective learning skills and psychologically are more inclined to individual forms of gaining educational services, AI based learning is almost an ideal form of getting knowledge for them;

- artificial intelligence for children from 0 to 6 (educational robots, computerized nanny programs, etc.) (Andrew Ng, Michiro Negishi, Lasse Rouhiainen, Fernando Buarque, Nicky Roberts, Tahilidzi Marwala etc.) – scientific research in this area are carried out both in the area of using AI by parents for daily developmental activities with the child (to learn colors, songs, new words, tactile exercises, etc.), as well as many books for children are published that explain to the child in the form of a fairy tale about AI and its place in the modern world;

- artificial intelligence-based programs for self-education and advanced training (Stuart Russel, Peter Norvig, John Mueller, Luca Massaron, Taria Rashid, Ethem Elpaydin, Aoife D'Arcy etc.) – this area was the first one which gained complete comprehensive AI based programs, that are also certified by states and are actively used in the continuing education and vocational training systems

Researches on other issues (AI based teaching and educational technologies for the elderly, people with special needs, for studying different sciences and obtaining various skills, etc.) are also underway, but today they are not as massive and fundamental as the above mentioned.

*Meta.* The purpose of this article is to analyse the forms of using the capabilities of artificial intelligence to organise the educational process for primary school students, that became more active because of the COVID-19 pandemic.

*Методологічна основа.* While making the research mainly empirical and theoretical research methods were used, that is typical for scientific studies of this kind. As to the empirical research methods, such ones as observation and comparison to analyse the background of the problematics were used as well as study of scientific research literature. Among the methods of theoretical research, such ones as abstraction, analysis, synthesis, idealisation, induction, mental modelling, ascent from abstract to concrete, etc. were used to predict and substantiate possible development options of AI based technologies and methods of teaching humanities for primary school children at the time after the COVID-19 quarantine ends.

*Scientific novelty:* Particular attention is paid to the humanities' teaching in elementary school – the area that has traditionally been considered unsuitable for using artificial intelligence as a method and form of teaching.

#### **Результати дослідження**

##### **1. AI for children age 6-10: age features**

Today in the pedagogical space there are many programs and methods of teaching various disciplines for students of different ages who use the capabilities of artificial intelligence. However, these programs mainly exist in the field of non-formal education or for individual use to increase the level of knowledge. And if for older children such programs are already actively used in the educational process (for self-monitoring, completing and checking homework etc.), complex programs are being developed, for primary schools such opportunities are artificially limited by teachers themselves due to traditional ideas about the possibilities and psychological needs of the age period mentioned. Traditional features of this age that influence the educational process and until recently were considered to be the ones that make the process of AI technologies using in primary school unreasonable and impossible are:

- need for active communication;
- the possibility of changing activities (training – game);
- swings of mood and learning activity;
- lack of concentration and memorisation habits [1].

Also, communication with the teacher and other students by computer removes the emotional stress and fear of the teacher, which is present in 78% of primary school students in the first year of school, 45% in the second year of study, and in 15% remains until high school. AI today is able to help a primary school teacher solve many emotional problems that primary school children have both in distance and in lessons with personal classroom communication.

##### **2. AI based programs for primary school education process**

*Automatic rating.* A specialised computer program based on artificial intelligence, which is able to give ratings even for creative tasks in the field of reading and studying languages according to specified parameters (for example: the number of verbs in the essay, graphic parameters of letters, presence / absence of keywords, etc.) [7, 12-14]. Such programs can evaluate students' knowledge, analyse their answers, give feedback (recommendations based on given parameters) and make up individual training plans on the subject [4]. Also, similar programs today are able to analyse not only written, but also oral theists, as well as graphic tasks (from assignments for calligraphy to drawings made by younger students);

Virtual assistants. At the moment, there are already assistants for teachers who are able to respond accurately and quickly to students' questions, thanks to built-in computers with AI [5]. Also, simpler virtual assistants «live» in the mobile phones of primary school students. On the one hand, they favourably affect the emotional state of the child (the child has confidence in his/her abilities, since he/she always has someone who will help him/her in a difficult situation at a lesson). On the other hand, the choice of an assistant (its color, shape) reflects the child's inner world at a particular point of time and can serve as a certain type of monitoring the child's emotional state. Also, often such virtual assistants in mobile phones require the child to perform certain duties (feed, play, entertain it, etc.), which contributes to the child's self-discipline and aesthetisation of his/her personal space;

Virtual lessons. It is difficult to overestimate the visual and emotional effect that virtual lessons create for younger students. With the help of AI based technologies, teachers can not only illustrate lessons in music (virtually attending concerts), arts (through virtual tours of galleries and museums), but also create the «presence effect» in the forest, on the seashore, etc. when primary school students study such subjects as ecology, natural history, history, literature, etc.

During the quarantine period caused by COVID-19, computer and AI became an organic and obligatory participant of the educational process, even in primary school. Many students due to temperament, personal features of character, etc. found this form suitable for them. It can be concluded that the primary school in the period after the quarantine becomes more AI.

### 3. AI based programs for primary school teachers.

This section presents artificial intelligence-based technologies designed to facilitate the work of a primary school teacher and make it more productive.

Interval training. These types of programs aim to check the residual knowledge of primary school students. Their essence is that the AI, based on the standard school curriculum and the tasks that the student passed in the personal account, tracks his/her progress and is able to find out information that most likely the student could forget and give recommendations for its repetition [3, 27-29]. These types of programs are especially useful for teachers at the beginning of the new school year to find out which topics should be repeated with primary school students in the classroom and what should be left for independent repetition at home;

Feedback for teachers. Primary school, and especially the humanities there, is the fertile ground for individual, creative and innovative techniques. Each primary school teacher to one degree or another develops his/her own methodology, finds own approaches to instill in the child love for the process of obtaining knowledge in general and for a specific subject in particular. Primary school teachers willingly share their methodological findings with each other – this is considered normal [6, 12]. Today, chatbots with AI are increasingly used to determine the «viability» of the particular methodological innovation. They are able not only to collect opinions through a dialogue interface, but no find out the reasons for this or that opinion;

Personalized training. Personalised learning refers to a variety of educational programs in which the pace of learning and the educational approach are optimised for the needs of each student. Experience takes into account learning preferences and the specific interests of different students. Artificial intelligence easily selects the right pace for the student so that he/she can better learn the program. In primary school, such programs are recommended as additional tools for students with special educational needs (both for lagging students and those whose success is above average) [8]. Such programs are extremely important for primary school, since children at this age have a different reaction rate, the rate of assimilation of the material, are characterised by bursts of educational activity, which can be replaced by apathy.

The progress in AI and machine learning is impressive; this area of education is constantly evolving. There are so many good ideas that AI can implement. In general, AI can significantly improve education systems due to its ability to optimise many parts of the teacher's work and, ultimately, giving them more and more time to spend on their students.

**Висновки.** For today it is already obvious that the world will never be the same again and we are to face the Pre and Post Corona world's differences everywhere: both in global processes and at the level of daily little things. Education is of no exception. Artificial Intelligence based technologies that before the Coronavirus Pandemic played an important role in certain aspects and fields of study as an additional component, during the Corona period began to dominate at all levels of educational services. This trend should continue after the removal of the restrictions associated with the pandemic. Under a great concern among teachers due to the peculiarities of the psychological development of children has always been the question of AI based teaching methods active use with an age group of 6-10 years (primary school period), especially in teaching humanities. The main argument against was the dominance of individual forms of work in such types of training without the interaction of children with each other. In other words, the weakened communicative aspect. Today, this problem has been already solved both at the technical level (conference-call formats widen the teaching opportunities in general a lot), as well as the concept of «communication» has been expanded to include communication using video communications and other popular sources.

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### ШТУЧНИЙ ІНТЕЛЕКТ В ПОЧАТКОВІЙ ШКОЛІ: НОВІ МОЖЛИВОСТІ, СТВОРЕНІ COVID-19

*Ідея використання можливостей штучного інтелекту для потреб навчального процесу не нова для сучасної педагогіки, але її розвиток у період до пандемії COVID-19 був досить фрагментованим. Умови, що виникли у період пандемії, самоізоляції та тривалого карантину змусили шукати нові можливості та форми для продовження навчального процесу. І тут на перший план вийшли можливості організації навчального процесу для всіх рівнів освіти з використанням штучного інтелекту.*

*Метою даної статті є проаналізувати форми використання можливостей штучного інтелекту для організації навчального процесу для учнів початкових класів. Особлива увага приділяється викладанню гуманітарних дисциплін в початковій школі – галузі, яка традиційно вважалася непридатною для використання штучного інтелекту як методу та форми організації навчання, що становить наукову новизну дослідження.*

*У процесі написання статті використовувались **емпіричні та теоретичні методи дослідження**, що характерно для наукових досліджень такого роду.*

*В якості результату можна відзначити, що карантин, викликаний пандемією COVID-19, зіграв сприятливу роль у розширенні спектру можливостей використання штучного інтелекту в галузі освіти, навіть у тих сферах, які традиційно вважалися непридатними або неефективними для нього через особливості навчального процесу. Під час карантинного періоду, спричиненого COVID-19, комп'ютер та ШІ стали органічним та обов'язковим учасником навчального процесу навіть у початковій школі. Багато учнів через темперамент, особисті риси характеру тощо вважають цю форму більш підходящою для них.*

*Публікація відбувається в рамках дослідницької програми «Порівняльне дослідження професійного розвитку вчителів початкових класів у Китаї та Південній Кореї» (реєстраційний номер ZKNUC2017038)*

**Ключові слова:** штучний інтелект; гуманітарні науки; початкова школа; карантин; комунікаційні технології.

Стаття надійшла до редакції 11 листопада 2020 р.

Рецензент: доктор педагогічних наук, професор Л. С. Калашиник