The Role of AI in the Education and for the Education

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Abstract – **Education and society always lag behind technical state of the art achievements. General computer literacy needed decades to become the part of public acceptance after computers become available. Smart phones enters our life and becomes an extension of the human body yet we still do not know how to properly apply them in education.**
Artificial intelligence is an exciting technology that adapts educational experiences to different learning groups, teachers and tutors. Intelligent Management Systems (IMS) are not a novelty in education though. There have been many experiments, but they have all somehow stalled due to immature technology or misinterpretation. We can now see a new impetus for AI in education, and its impact will soon be very noticeable.

In education, AI can: personalize learning, connect and create innovative learning content, perform tutoring in intelligent tutoring systems, is used to help pupils with special needs, help teachers assess, give students access to learning content, and translate educational content from different languages, removing language barriers.

This article will explore the different possibilities of using AI in education and its use in education.

Keywords: education, AI, ICT, benefits, competences

I. INTRODUCTION

Since starting using computers in education, some have been thinking about how to "replace" a teacher on some tasks. Computers have some advantages over humans, as well as flaws. At least two benefits are self-evident: (1) we can turn them off, and (2) does not need additional time to learn, just load the program data and is ready to work. The need for years of learning is the holy grail of humanity. If we were able to upload the knowledge of previous generations into new brains, our development would be much faster than it is today. The question is whether it would be manageable on our biological processing units (brains). [1]

The first experiments with the introduction of artificial intelligence into education were carried out in the previous millennium. The impulse came from expert systems for other areas (mainly medicine), and researchers wanted to apply it in education but found out that time was not yet right. [2]

Conceptually, however, the system is still interesting today (Figure 1). A look at the scheme shows that we want to have a suitable model to identify the characteristics of the pupil and help with education – i.e., selecting learning content for the knowledge that the pupil does not have. Of course, the model gave no guidance on how this should be done in practice. We can see the analogy with a teacher who knows the pupil and interacts with him. Over time, he knows exactly what the learner knows and where else he needs to consolidate his knowledge to continue his education successfully.

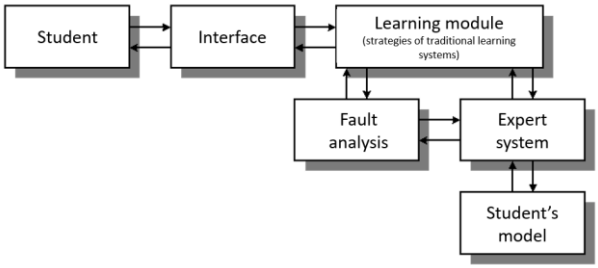

Figure 1: Intelligent learning systems [1]

II. ARTIFICIAL INTELLIGENCE IN EDUCATION

Artificial intelligence is increasingly integrated into our daily lives, and we often do not even realize that there is artificial intelligence behind something (web search, recommendations, devices that speak, etc.). This is reason enough to teach citizens the basics of artificial intelligence. It will make us aware and provide us with the knowledge for the informed decisions about artificial intelligence and how we let artificial intelligence to be integrated into our lives. We need to start incorporating AI literacy into primary and secondary education teaching so that our younger generations can use AI efficiently and meaningfully and are not afraid of AI.

The principles of any new technology initially seem like magic that is impossible to understand but eventually becomes a part of common knowledge. Teaching the principles of AI is needed to smoothen and accelerate its use.

The goal of AI technology is also to assist teachers, not replace them. Nevertheless, teachers themselves need a better understanding of the capabilities and limitations of AI. They need to understand the steps AI takes to choose intelligent assistants wisely, depending on the teachers' goals in the classroom. Educators see that Artificial Intelligence is crucial to their institution's competitiveness, but most institutions do not have a formal data strategy for

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AI advancements. This chapter will discuss some important topics of AI use in education.

A. Personalized learning

Personalized learning with artificial intelligence is a learning approach that focuses on the design of learning, taking into account the specific needs of each pupil. More precisely, this means that the learning components, such as learning pace, personal preferences, a form of instruction and learning styles, are adapted to meet the learner's needs and thus increase the efficiency of learning. Research has shown that personalized teaching is much more effective than teaching an entire class [3]. The problem is that the teacher is unable to adapt his teaching to the whole class, on the other hand, individual teaching of each pupil is particularly unworkable. The use of technology for these purposes has been being investigated for a long time and, due to the increasing digital traces that students are leaving, is making tremendous progress [4]. AI and machine learning excel at identifying patterns that are not recognized by humans, often due to a large amount of data. Therefore, by analyzing the educational data of the pupil, the IU can help the teacher identify how individual pupils understand the substance.

There are two ways artificial intelligence can help here. In the first use, AI helps the teacher with valuable information about the student. The teacher can react appropriately and adjust teaching for the pupil with additional explanations and tasks. In another use, the AI can take full advantage of the teaching of the pupil and offer him personalized learning content.

For both modes, we need to capture, combine and analyze data from several different sources, including learning applications, online resources, publishers and other learning systems, to create a comprehensive learning model for individual learners [5].

What benefits of personalized learning does the AI offer? Here are some of the benefits: [6]

a. Increase motivation, engagement and learning outcomes

Machine learning algorithms can predict results using the learner's digital traces, which allows us to adapt learning content based on past results and individual goals. This includes scenarios in which the system would recognize that a pupil could actually skip a few modules to take a more comprehensive and less linear learning path than someone who might lack the basic skills associated with the subject.

b. Shift to effective learning resources and tasks

Pupils receive the exact learning (e.g. online) resources they need to fill the knowledge gap and understand and achieve learning goals, which means less time to learn.

c. Automate access to learning resources

AI can guide students through personalized learning pathways that are automatically attached to learners' knowledge, which is determined by activities in the digital learning environment. With the appropriate criteria, learning content can be offered to try to target perceived knowledge gaps.

d. Dynamically adaptive learning platforms

Learning platforms are systemically upgraded with the ability to dynamic self-learn from behavior displayed by teachers and students in the digital world. As a result, they create appropriate pedagogy and automatically adapt e-learning environments to suit pedagogy.

AI can prepare teachers in advance to prepare student profiles so that teachers are better placed to take advantage of their training and skills to address the individual needs of these pupils from the outset, rather than spending weeks or months identifying the learning difficulties of individual pupils.

B. Cross-referencing of learning content

Part of personalized learning tailored to individual needs, desires and interests is learning pathways that can be adapted to a wide and diverse population of learners through computer technology. One of the key problems is the identification of the learning pathway that pupil follows to complete the curriculum. Existing methods generally rely on prior knowledge of the content of the learning pathway creator, which also sets the conditions and limits for determining the sequence of learning materials.

The efficient use of AI, data and analytics and machine learning can enable teachers to create a proper learning experience and create personalized learning pathways for each student individually. In this case, the AI facilitates various learning content, such as online learning materials, educational videos, verification tasks, and other forms of learning content. The AI determines which content the student will deal with in the next step by collecting data on the learning process.

The student thus acts as a recipient who reacts to predetermined skill sequences, follows the learning processes and then carries out the learning activities set by the AI to achieve predetermined objectives. The typical implementation of such learning pathways is early research in intelligent tutor systems, which are now upgraded with AI [7]. In the future, we can look forward to upgrading personalized learning pathways within dedicated environments that will take care of student-tailored content and respond to the pupil and his learning process.

C. Students with special needs

AI is significant for children in need of special treatment in education. These children mostly have one learning problem, some have breakdowns in social skills such as language and communication, or have difficulty reading, writing and math. With all this in mind, it is obvious that the traditional approaches for such child in education does not apply. Because of its uniqueness, education needs to be adapted to be effective [8]. Below we present three areas where the use of AI makes sense:

a) Personalized education for each student

Educational apps with AI included are usually tailored and funnier for kids. Students are more confident since there are usually no classmates in the apps to compare with. Besides, they can learn anywhere, anytime.

b) Increasing the length of attention

The student's attention is shorter when we deal with children with special needs, so applications with built-in AI make sense. These applications detect that the student's attention is declining and they can regain it through various measures.

c) Differentiation and individualized content

The AI helps children with special needs with an individualized approach based on the student's learning profile. In this way, the AI can develop a variety of content that strengthens the areas that the learner needs to improve.

One consequence of the use of AI in education may also be inclusive pedagogy, which includes all children, regardless of their possible categorization of special needs [9].

III. TRANSLATION OF LEARNING RESOURCES

There are many high-quality e-materials on the World Wide Web or in various repositories of learning materials. Their biggest problem is that they are usually prepared in the author's language of the e-material. As a result, the availability of e-material is reduced, as the language barrier is usually too high for teachers. Therefore, teachers are often wasting their time preparing their e-materials, which could be used for better preparation for instruction. This was mainly demonstrated in the COVID-19 crisis, which showed that teachers were repeatedly exhausted to produce videos for crisis teaching at a distance [10].

Computer translators across languages have made great strides in recent times, especially after including artificial intelligence in the operation of translation algorithms. Translators no longer work based on programmed rules, but learn from the corpus of translation works, through which they draw their own rules for translation between languages.

Translators can be used by permanently translating e-material into the target language. This method is not recommended when translating professional works, as it is nevertheless necessary to review the translation professionally. As translators learn, the need for such peer review will decrease over time.

Compilers can also be greatly used to translate videos, as speech recognition has progressed similarly to translation itself. Video translation thus takes place two-step, first recognizing speech and then translating text into the target language. With the progress of synthesized speech, we will soon also have synchronized videos that your computer will fully implement. [11]

The translation is also possible in real-time, which can be significantly exploited in group lectures, where listeners are from different language areas.

In any case, the progress of translators will make it possible to use e-materials from different languages, which will, above all, help Europe and countries that cannot afford to prepare their e-materials for all subjects.

IV. BASIC LEARNING CONTENTS OF ARTIFICIAL INTELLIGENCE IN COMPULSORY SCHOOLING

Intelligent agents are becoming better and better interlocutors, some of whom have already passed the Turing test. Robots in the workplace are becoming more common. In North America, fully autonomous cars are already being tested. In entertainment, artificial intelligence is increasingly present, from proposing video content to writing articles in renowned newspapers [12]. As a result, the need to demystify AI in education will increase.

The growing contribution of artificial intelligence technologies to everyday life and social changes on the horizon with the further development of these technologies raises the question of whether basic knowledge of artificial intelligence learning content should also be taught in primary school. If we want our children to make informed decisions about the impact of AI on their lives and society, the answer is yes.

However, understanding the basic concepts of AI requires a basic knowledge of computer science, which is also barely making its way into the compulsory curricula of compulsory schooling. The situation is paradoxical in its own way, as society is becoming increasingly dependent on computer technologies, while the introduction of computer-based content is very slow. We also forget the active population, which has not been taught about the contents of the AI but must already decide on this or work together with AI technologies. Therefore, teaching the basic contents of the AI should be carried out holistically, which means that we should now address both students and the active population, and later it is enough that only students are taught.

What are the basic contents of AI that you should teach?

Touretzky and Gardner-McCune talk about five great concepts [13] that are:

1. Perception, computers perceive the world using sensors.
2. Presentation and reasoning, agents build world representations and use them to reason.
3. Learning, computers can learn from data.
4. Natural interaction, intelligent agents need many different types of knowledge to be able to interact naturally with human.
5. Social impact, AI can influence society in a good and bad way.

We can start teaching some AI-related content in the lower grades of primary school, where we can help ourselves with activities that have inspired the computer science unplugged movement. Authors Lindner and Seegerer have prepared five activities [14] that can be performed without a computer and teach us about some AI concepts through activities, such as classification with decision trees, reinforcement learning, and simulation of the Turing test.

V. CONCLUSION

The future development of the field of artificial intelligence in education should lead to the iterative development of student-centered learning, with data-based and personalized learning.

It should be emphasized again that artificial intelligence will not replace teachers. They are often quoted by dr. Thornburg that "Every teacher who can be replaced by a computer deserves it" is controversial, while stressing the fact that there is currently no technology that can emulate, let alone displace, the myriad skills and qualities of a great teacher. The importance of the role of the teacher is far from becoming secondary to the emergence of these new technologies. The prospect of artificial intelligence for teachers lies in its ability to increase the effectiveness of their teaching and help them provide ideal conditions in which their students can learn and grow [15].

Artificial intelligence will free the teachers from the most time-consuming and monotonous tasks, such as grading exams and checking plagiarism in documents. With the help of personalized learning content and artificial intelligence, as a teacher's assistant, it will help the teachers in preparation of time consuming reports. Artificial intelligence can transform and liberate innovations in education. But one question still remains – Who will teach the teachers?

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