Evaluating Artificial Intelligence in Education for Next Generation

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Abstract. The use of Artificial Intelligence (AI) is now observed in almost all areas of our lives. Artificial intelligence is a thriving technology to transform all aspects of our social interaction. In education, AI will now develop new teaching and learning solutions that will be tested in different situations. Educational goals can be better achieved and managed by new educational technologies. First, this paper analyses how AI can use to improve outcomes in teaching, providing examples of how technology AI can help educators use data to enhance fairness and rank of education in developing countries. This study aims to examine teacher's and student's perceptions of the use and effectiveness of AI in education. Its curse and perceived as a good education system and human knowledge. The optimistic use of AI in class is strongly recommended by teachers and students. But every teacher is more adapted to new technological changes than students. Further research on generational and geographical diversity on perceptions of teachers and students can contribute to the more effective implementation of AI in Education (AIED).

1. Introduction
The educational and learning process has been happening since age. The performance of students and teachers is estimated based on many criteria. In general, teachers evaluate students for certain predefined reasons: discipline, creativity, participation, speed of learning, obedience to the teacher, etc. Among them, the attention to the subjects of the student and strength to reproduce their understanding in the exam occupies the first place in the list. Marks/grades for the student's knowledge of the subject area at the top of the list for many reasons. The important reasons are the appropriateness that a teacher should evaluate a student based on their responses to questions over a given time [1].

Measuring other aspects in them requires a thorough effort from the teacher, who is already quite busy with professional and personal work. To measure their other skills, most teachers use their preconceptions to make it easy to complete an assessment. Therefore, an appraised student can hardly use actual skills, knowledge, and abilities. Students value a teacher based on their ability to interact with students, knowledge, subject matter, level, empathy, and many other factors. In most cases, students prefer to be teachers' favorites, and teachers have always been accused of being biased against
some students. This usually happens when the student can't grab the teacher. In this context, the actual focus of both the teacher and the student is deviated [2].

Student learning models and teacher teaching models change from time to time due to many of these deviations. In the current scenario, students need a simple way to learn, and they are also expected to be mentors. This changed the structure of teaching and teaching materials. The use of AI in education has attracted attention in the following ways:

- **Automation:** The simplest use of AI often provides the most immediate benefit: by automating simple tasks such as evaluating, classifying digital assets, or schedule, teachers can increase time interacting with students.
- **Acclimation:** Today's technology is an integral part of such an educational and business environment. On the latest data from Pew Research, 95% of young people approach to their smart phones, while 45% are almost always on the network. AI in schools will help students start the technological change.
- **Integration:** AI solution can be integrated with other IT initiatives such as intelligent technology and a managed IoT network to provide appropriate solutions to teach students.
- **Delineation:** Student needs and curriculum priorities are constantly changing, and ensuring that the content provided by teachers is relevant and practical, AI-driven Analytics in education helps identify key trends, draw key markers, and help teachers develop the most effective classroom that drives digital transformation.
- **Identification:** Data analysis allows us to understand that adaptive AI solutions will be identifying important areas for the learner. With strong security, access control, you can detect and handle the formation problem.

**Personalizing Learning:** The program in AI, commonly called an intelligent system tutor (ITS) or adaptive tutor, involves student's dialogue, answering questions, and giving feedback. ITS and adaptive teachers adapt learning materials, pace, sequence, and severity to meet the needs of each student. The AI could also support a student's special needs, such as teaching children to recognize facial expressions.

A study conducted by [3] states that teacher work can bring about many changes. The report on the market for artificial intelligence in the US education sector states that the use of AI in the education system will increase by 47% from the current level between 2017 and 2021. The companies also have several identified marchers who use AI for a digital platform for teaching, exams, and student feedback. These platforms relate to applications from pre-k to University level, bring new challenges for the student, identifying knowledge gaps, and redirecting them to new concepts as needed. AI application can bring benefits to the teacher and the community by creating an individual curriculum for the student's specific needs. It helps students get access to classes even in remote locations. The built-in AI can translate the teacher's presentation into any language that the student chooses. This will greatly benefit students with hearing or visual impairments. It also benefits students if they are unable to attend school due to illness or other reasons.

A student who wants to study a subject, but it's not in their school curriculum can study it by accessing global classes. They can get training programs outside the class with already developed and developing intellectual content. This applicability may or may not currently exist in all educational institutions. But there's a lot of power to make that happen. Research is currently being carried out to build a virtual human guide, capable of thinking, acting, responding, and communicating, using verbal and non-verbal communication.

2. **Background**

In the 1970s, AIED (artificial Intelligence Education) has emerged as a specialist area covering new technology to teaching and learning, mainly to higher education. AIED aims to provide more personalized, flexible, inclusive, and engaging learning, also automate daily learning tasks through automated assessment and feedback [4] [5]. In theory, AIED could help parents improve early linguistic development for their children, also helping teachers choose tools, organize classes,
increasing participation, and personalized teaching for their students [6]. AIED is contained as a robot or virtual assistance (VAs), and it combines virtual reality. It serves as sensors that capture visual, auditory, and physiological data of students and teachers. This data type of learning can further understand how learning occurs in real-time, and help teachers choose powerful approaches to teaching [5]. Tools AIED should capable to help act to combat student or teacher burnout [7] that may help eliminate the gap in achievement between students due to individual or social differences. However, despite decades of research [8], the tools AIED has not made full use of potential technology and seems far from fulfilling these promises [9].

Some teachers understand that their jobs may be at risk because of clever machines. Some training robots are created [9]. Most experts agree that while the teacher's part may change AIED increases rather than replaces the experience of the educator [10] [11]. Others argue that using it is relatively slow [12]. The benefits of using AI are the process of transformation and the necessity to fundamentally think about the role that humans play [13]. Effectively, using AI, researchers can let people do everything in their power: cope with a high level of decision and abstract thinking [14].

To realize these benefits, future teachers should be able to use artificial intelligence [15]. This includes the evolution of a realistic understanding of the possibilities of AI. To successfully organize and controls the services of AIED in interpreting data to improve educational approaches [16]. Instructors and teachers would need to prepare their students for the rapidly changing world of AI with unknown requirements for future skills in the workforce. This is a greater emphasis on non-standard cognitive and mental health outcomes. Century, productivity, innovation, critical thinking, problem-solving, decision-making, and collaboration [11][12]. AIED can facilitate learning throughout life to teachers and students by providing online training options-on-demand.

NESTA-this is a British charitable organization that operates the worldwide Global Innovation Fund. In its report for digital skills for 2018, it will offer the following 16 skills to 21 centuries. They are divided into 3 categories shows in figure 1: basic knowledge, skills, and character traits. In another report, Schneider in [17] discusses future skills and argues that future work depends not only on automation but also on important trends in environmental sustainability, urbanization, growing inequality, political uncertainty, technological progress, globalization, and demographic change. They say the great emphasis is placed on interpersonal skills, cognitive skills of higher-order, and system skills. Originality, ideas, and active learning are very important. The future workforce will need broad knowledge, but also special qualities for specific professions.

![Figure 1: 21st-century skills](image-url)
The Frey & Osborne Report in [18] examined 702 detailed professions using machine learning AI in the form of Gaussian classification processes and revealed that 47% of overall employment in the US is at risk and that wages and education levels show a strong negative relationship with the probability of computerization of the profession. The Microsoft Education Blog AI in the classroom written by McNeill [19], sees that many smart apps are designed and created for education and student communities. Some applications like presentations, translators, seeing application AI, the lens is Microsoft Office, etc. they demonstrate their benefits from a point of view, improving the performance of students and giving opportunities for teachers to build a better curriculum course for students. For example, there are cases when the program AI is used as an "assistant teacher" who is trained in 40,000 messages. The program could answer similar questions based on previous answers. This assistant is the answer to the question of analyzing the relationship between the question and the programmed answers. In [20] author said AI could change the settings where students learn and by whom they are taught. Few students say they are afraid to answer a question from a teacher during class before their peers. They don't like making mistakes or being pointed out to them when they're standing in the middle of a class. In such situations, AI can provide excellent support by engaging in conversations with these people and strengthening their cooperation and interest in understanding the subject.

3. Artificial Intelligence in Education (AIED)

3.1. Overview
The potential for AI education has been discussed in the AIED academic community for nearly 30 years. Recently, the debate has shifted to the international arena of government policy, as data-complex algorithms, artificial intelligence, learning, processing power, and technology use has increased worldwide. There are huge potential benefits, but there are risks and opportunities for AI education and education. So we need to diligently and cautiously move into a new learning environment where AI uses to support students and teachers and where we also prepare students for the future in a world where AI plays an ever greater role.

There are several important trends in AIED, including intelligent tutor systems, pedagogical agents, smart classroom technologies, and adaptive learning, figure 2 shows the relationship between them, with the proviso that AI is currently embedded in technology or not.

![Figure 2: AIED System Architecture](image)

3.2. Intelligent Tutoring System
Intelligent tutoring systems (ITS) mimic individual learning humans [21]. Human learning is widely considered a very effective view of training. The human guides will have a thorough and extensive knowledge of the area for engaging and complex strategies for learning, such as dialogue. More importantly, effective teachers-people have to accurately diagnose the motivation and knowledge of their students and choose learning activities and goals according to the necessity of students. At the time of completing all tasks, teachers can use frames, tips; tricks and instant feedback to help students at every turn solve problems. Studies have shown that students have not fully used human guides because they rarely ask questions and the guides are not perfect, e.g. in diagnosing misconceptions about students or personalizing their curriculum tasks [22]. However, imagine human teachers use it, with intelligent systems that choose pedagogical and didactic strategies, involving students in individualized learning dialogues and improving over time [23].

Before coming ITS, computer training (CAI) has capable to give direct feedback to students, but only after the students have answered questions [24]. First ITS to go beyond CAI is SCHOLAR, 1970 [25][26]. The components of ITS are:

- Expert model (also called a domain model) where knowledge is stored securely.
- A pedagogical approach in which an effective education and professional training strategy are stored.
- The student model established characteristics of students or activities of Students in ITS. The system collects data or concludes the student's skills; false views, emotions, or motivation. Based on this, ITS can diagnose to compare peer models and provide personalized tasks, hints, or feedback.
- Interface for communication with the user. It can be written either in natural language through dialogue or without virtual pedagogical mediators representing ITS [8][27][28].

All of these sections are encouraged to study the various fields of cognitive science, psychology, education, and information systems. There are different types of ITS. They are very different in systems and it is necessary to understand that not everything is AI-enabled. It can be different from its content. Some focus on subjects with mathematical rules, some teach reading or writing, and still, others try to teach general topic skills, such as self-paced reading strategies [24] [25] [29]. The use of technology in learning is a relatively new area of development communities of computer science, machine learning, and cognitive psychology and sparked debate about ethical issues concerning the collection and use of confidential data, which are particularly vulnerable. In conclusion, it can be said that it can be a useful tool for educators. The important thing is that it is now rarely expressed in schools is what is technically possible. Where they exist in specific areas, they can effectively complement a student's learning inside or outside the class.

3.3. Pedagogical Agents

Pedagogical agent (PA) is digital or virtual characters, integrated learning technology to facilitate learning. It builds to incorporate the social, emotional, and motivational part of technology learning [30] [31] and interact with students through natural human [32]. PA can take different forms and outlines [33]. Most often PA incarnation, which means that students can see on the screen an image of virtual characters or avatars that are realistic or abstract resembling people, characters, animals, or objects. For example, PA characters can be as different as realistic three-dimensional solid-bodied people, two-dimensional cartoon animals, or objects like "Clippy," the Microsoft Office virtual assistant to a paper clip. PA communicates with students through written or oral language.

Recent technological advances have continued to enhance PAs [32]. Today, virtual humans are often created; advances in affective computing (systems that perceive, interpret, imitate, and even influence human emotions) allow students to acknowledge emotions and adapt to boredom or frustration. the tongue allows PAs to interact in limited interactive dialogues with students. PAs can even be an encapsulated robot to interact with students within the classroom. In the future, everyone can have several personal PA who send him throughout life. Thus, PAs can become very powerful.
from a technology perspective, even there's a benefit to having a lifelong PA which will remind us of times once we fail. The current PA still fully exploited technological possibilities with training functions [34]. Advances in a personal assistant or calling card, like Siri's at Apple, are promising that PAs. But it is unclear whether PA with a specific and narrow range of subjects or more versatile, conversational subjects will be more useful for teaching and learning in the long run.

3.4. Smart classrooms, learning environments, and schools
"Internet of Things" (IoT) is a term used to describe the growing ability of everyday objects to connect to the internet and communicate with other devices. It extends to smart homes, including light switches, refrigerators, and other household appliances [35]. Other examples include smart cities, smart transport, and smart environmental monitoring [36]. The growth in popularity of smartphones and other ubiquitous computers [37] allowed IoT to evolve further. IoT is a broad, comprehensive concept that covers all the wider use of sensors and technologies to collect and transmit data on everyday objects and wearable devices. This data provides powerful input signal systems to AI.

IoT is important for smart classrooms, smart learning environments, or smart schools [38]. Smart classrooms are defined as technology-rich classrooms with wireless connectivity, personal digital devices, sensors, and virtual learning platforms [39]. An intelligent learning environment expands definition, including a multifunctional flexible physical space accustomed to learn and teach. In training rooms, more individual data collected using sensors within the class, like cameras, microphones, or motion sensors. Students and teachers also can be carried along by sensors to gather data and received by the varsity or establishment. The sensors are often embedded in clothing or other portable items, like RFID (radio frequency identification) attached to the physical body, like smartwatches, armbands, smart glasses, technology testing of the brain, and device medical monitoring.

After collecting data from a smart class, learning environments or school may be interpreted by systems and AI or human representatives to improve teaching and learning. To put it simply, most technology existing intellectual classes are devices that measure and report big data. There are currently very few large-scale applications of AI using this type of data used to influence learning classes [40]. Intelligent schools based on artificial intelligence: there are reports on the use of information in intelligent classes to automatically adapt the physical environment (lighting, air conditioning, and heating) in schools for training purposes [41] [35] [42]. Some researchers have put forward a hypothesis about the system using the mind postures of the body and AI [43] or propose a monitoring system for non-verbal behavior by teachers and provide real-time improvement suggestions for communication, hand gestures, facial expressions, and body language [44]. These examples show that studies are wise in the classroom, learning environments and schools are still in their infancy. Despite the availability of technology and tools for AI, most intelligent classroom applications remain only in the testing and feasibility study phase. The future is smart classes can include full context awareness where each case study identified and possibly supported by real-time adaptive help.

3.5. Adaptive learning and learning analytics
Adaptive custom learning and teaching is an important goal of training and is used as the main reason for the development of ITS, PAs, and intelligent classes. While ITS and PAs offer a user interface or embodied agent for learning to support AI, these systems often use an adaptive system running in to serve individual educators for learning activities to students [45]. The educational adaptive learning (also adaptive learning) refers to changing curriculum tasks, the complexity of teaching tasks, or interface on demand of individual students or groups of students. Adaptive approaches to learning focus on the behavior of students, their achievements, and preferences in learning. Adaptive learning is also an important concept in computer science, where algorithms are developed to determine how and when to adapt to the learning environment and/or tasks. For example, ITS goals boost students'
competence in the field, may use adaptive training to provide students with prompts so independently solve more complex tasks. Adaptive learning is used to gradually withdraw from asking until competence is achieved and more complex tasks are established, so keep students in the zone of nearest development [46]. Learning analytics uses human judgment and uses automated data analysis, potentially using artificial intelligence to support it. The training table aims to gain skills in education and conditions that can be used to make people's decisions better.

4. Data Analysis, Results and Discussions
As a data collection tool, online open structured surveys were selected to obtain short or long narrative responses from participants [47]. These open questions give the researchers more valuable inputs. The topics will determine the perceptions of student and teacher participants about AI, and the extent to which AI can be used in education. All responses were collected online from different participants in different locations [48]. An online survey shows the low cost and high-speed response, which makes the total survey more convenient. The snowball of samples has helped collect participants from India, the US, Greece, and Qatar.

The two forms of Google are prepared to use separately by teachers and student attendees. The data is exported to Excel spreadsheets, which are then imported into MAXQDA 2018.1 counting coded segments. The software operations that support activities related to interrogation [49]. Comparative analysis of data obtained from students and teachers.

79 people took part in the online survey, of which 41 were students and 38 were teachers. Among the participating students, some are currently continuing their studies, and some have already completed their studies. At the time of this survey, all participating teachers are occupied in this profession. Referring to the participant's statements, teacher respondents are referred to as TR, and student respondents have referred to SR.

4.1. The benefits of AI could range from good to worse
Few teachers are uncertain to accept new technology. Mainly they will experience a comparison of their school experience, and they feel it was a positive outcome for them with their digital education systems, then why not be the case for the current generation of students? Figure-3 depicts a teacher's perception of AI in this study.

![Teachers perception on AI](image)

Figure 3: Teachers perception of AI

The resulting coded segments show that while most teachers feel that AI is an upcoming trend, there are a few people who look at AI as destruction. An equal percentage of people expressed the opinion
that AI helps with learning and suggested the restrictive use of AI. Few teachers believed that AI was just a tool used in various streams of education.

TR-20: this is the future of any data analysis. It adds an extended version known as deep learning also very useful to analyze.

TR-12: yes, the coming era is only AI. It helps us as a teacher to improve teaching methodology and create more interest in students.

TR-21: Limited use is a better teaching profession.

TR-36: Any instrument that reacts to the actual situation.

TR-28: Destroys the main natural thinking. Humans have already become like a robot surrounded by various contraptions. Gradually gadgets begin to prevail with people.

Analyzing figure 4, perception of students, AI is useful to fifty percent of student participants. The coded segments have shown that their perceptions are useful to harmful. Some students thought it was beneficial and harmful while some thought it didn't match the human potential.

![Figure 4: Student perception of AI](image)

SR-4: replacing human intelligence with mechanisms/technological intelligence to enhance teaching performance.

SR-29: it's not as useful as this investigation.

Comparing the perception of AI with teachers and students, we see that in both games most of them claimed that AI is a useful technology, and about the same ratio of participants in both categories claimed that AI is harmful to the human world. Speaking about the school environment where students learn with the support of AI, Alex beard emphasized the great influence of AI on the student's learning model. The care taken to explain in detail to each student is noted. Here need to understand that perceptions are individual, depends on his experience or awareness of AI and its use. The awareness and experience guide individuals on how and where AI applies to education, this can cause the accurate adoption of AI.

4.2. Education for Next Generation with AI

Participants were asked questions about what the teaching patterns and learning patterns would be with teachers supported by AI, but most teachers said that a small percentage of participants would not be effective shows in figure 5.

TR-9: AI has become inevitable. Even higher education-students pay attention to it.

TR-36: not 100% perfect.
When teachers asked about how the teaching model would look if class teachers were completely replaced by robots, nearly ninety percent of participants were against it, except for a few people who didn't quite clearly envision how this model would work even without a teacher shows in figure 6. TR-29: Robots can only produce robots. That law of nature.

When students are asked how they feel about a teaching model in which a teacher enjoys AI, about two-thirds of them say yes, and one-third is negative shows in figure 7. 
SR-3: The educational model has improved and also provided extensive skills for the teacher.
SR-14: It more realistic perspective to realize that students get what they experience.
Figure 7: Student perception: teaching pattern with a teacher supported by AI

When they asked about their contributions to completely replace classrooms with teacher-less robots, almost 80% of students said No, from which the segments "do not stand, lose the human touch and destroy the school structure shown in figure 8.

Figure 8: Student perception: Robots replacing the teachers

SR-3: It's not a good idea, and student shows no interest in coming to class, manual intervention is always necessary".
SR-14: I believe that there is a downward trend, it is when a teacher cannot be replaced by robots because they are not flexible enough for the student and the teacher, regardless of where the technology is taking the initiative, the student is always a teacher need to use their creativity and skills. Comparative analysis of the reactions of teachers and students shows that the first and second supports the use of AI as an aid to teachers. Additionally, most of them (out of both categories) disliked the substitute teacher. An AI-supported teacher can show better results, as suggested by the participants. The comparisons identified several opportunities that technology can offer to education.

5. Future hold of AI in Education

So how to tackle artificial intelligence closer to real models of human thinking, what is their impact on education? In general, the next steps in AI in education take three main forms:

- **Personalization of performance**: increasing computing power and complexity will allow AI solutions to better collect and generalize information, which helps teachers to build
personalized curricula. New solutions, such as Brightspace Insights, create to collect, aggregate, and evaluate data, allowing teachers to gain students” insight on the entire ecosystem of learning tools.

- **Violation bias**: the human bias remains a stumbling block in education and, as stated, also a new problem in AI tools. The future of AI in education will need to use solutions that can evaluate work and evaluate exams using established headings and criteria on how to automate completion to eliminate bias.

- **Combined assistance**: teachers usually are masters in their field; many of them have a few degrees and often specialize in very specific areas of development and student outcomes. The problem is that the necessary administrative work is often a frustrating effort of teacher synergy with students. Here, the future of classroom intelligence takes shape with managed AI assistants who make the necessary data to help teachers do what they do best: communicate with students.

6. Conclusion

Artificial intelligence and its use in many segments of our normal lives appear to be growing day by day, and the same has been reported in various studies. In the field of education, AI began to exert its influence, acting as an auxiliary tool to support the teaching and learning process. The current study showed that teachers and students should understand more if application AI can benefit them in the development of their skills in education. It also determined that the optimal use of AI technology can produce better results. Several platforms and trends promised the future development of AI education, which is very attractive, and in some cases even inaccessible under certain conditions. However, learning from computer systems is unlikely to be fully capable of replacing human teaching in schools.

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