# Artificial Intelligence and Its Relationship to Teaching School and University Mathematics in Jordan

Dr. Hamzeh Ahmad Abdurrahman Al- qiam[1*], Riyadh Ahmed Saleh AL-Derabseh[2], NAEIMA AEIAD HAMAD ALARIFI[3], Azhar Shater[4], Dr. Haron Ismail al-lawama[5], Saddam Rateb Darawsheh[6]

[1]*Assistant Professor, Curricula and Teaching Methods of Mathematics, Faculty of Education Sciences, Jerash University- Jordan; E-mail: h.qiam@jpu.edu.jo , Q@jpujpu2019*

[2]*Irbid National University Faculty of Educational Sciences Derabseh@gmail.com*

[3] *HIGHER INSTITUTE OF ENGINEEING TECHNOLOGIES_BENGHAZI Oil and gas information technology naimaelorafee@gmail.com*

[4]*Assistant Professor College of Education, Humanities and Social Sciences, Al Ain University, Al-Ain, UAE 0000-0003-3538-8378, azhar.shater@aau.ac.ae*

[5]*university Malaysia Terengganu, Malaysia haron588@yahoo.com, https://orcid.org/0000-0002-2423-0746*

[6]*Department of Administrative Sciences, the Applied College, Imam Abdurrahman Bin Faisal University Dammam, Saudi Arabia. https://orcid.org/0000-0001-8653-7869, srdarawsehe@iau.edu.sa*

**Abstract.** This study aims to study the scenarios that may arise with the introduction of artificial intelligence in education, especially in mathematics education in Jordanian schools and universities, and what its implications are for the future of schools. The study design was phenomenological, a qualitative approach that looked at the perspectives of participants from various fields. The findings suggest that as AI in education becomes more prevalent, schools and teachers will encounter new products, advantages, and disadvantages. The findings highlight several recommendations for using AI and preventing potential problems and while participants generally seemed to have positive views of AI, there were some negative aspects as well, to which mathematics teachers and academics in particular drew attention in relation to the future of education. While educators view AI as a tool to bring quality and benefit to all in the education sector, they are more focused on the rationale for AI in education and potential future issues.

**Keywords**: Artificial intelligence; Education; Management, Jordan.

## 1. INTRODUCTION

The government recognizes the pivotal role of artificial intelligence in the growth of a sustainable digital economy. This is through the use of artificial intelligence in mathematics education in Jordanian schools and universities. This is supported by the general policy for the information and communications technology sectors for the year 2023, which states in Article 8 that its main goal is "to benefit from the opportunities of the industrial revolution, with the primary goal being to develop the digital economy that leads to To renew economic development and increase the income and wealth of Jordanian individuals. The government wants Jordan to benefit from new and existing digital technologies, such as artificial intelligence, blockchain, and the Internet of Things through communications and information technology. Artificial Intelligence Policy in Jordan (2023), which the general public usually defines as the ability of robots or computers to think and act in the same way as humans do, is an attempt by computerized systems to mimic the human mind and activities (Wartman & Combs, 2018). Accordingly, the basic concept of AI is skillful replication of AI Human thought or behavior through tools or programs (Mohammed and Watson, 2019). Tims (2016) argues that it may be an illusion of the current system to believe that artificial intelligence will be applied to personal computers. It may enter our lives in many ways and take different forms. Ng (2017) asserts that the "new electricity" of this generation is artificial intelligence. By presenting it as an important factor in ensuring economic progress with its potential, AI is a candidate to be portrayed as the key element of the Fifth Industrial Revolution (Gulick, 2019). This may be the case because investments in AI hit a new record high of $40 billion in China in 2017 (Mou, 2019). China

is expected to boost its GDP by 26% ($7 trillion) by 2030, in line with the revenues it receives from artificial intelligence. According to PricewaterhouseCoopers forecasts for 2017, North America will grow by 14.5% ($3.7 trillion) during the same period. These statistics help the public to appreciate the value of artificial intelligence and its impact on the world. As for Jordan, the use of artificial intelligence in school and university education for mathematics and its impact on the future workforce, this in turn directs the economy and workforce and paves the way for the second industrial revolution. In our case, the future of education is also important.

The comprehensive development of artificial intelligence will have an impact on a variety of scenarios, including the management of mathematics classroom instruction and the reorganization of the social system in general. Some of the key institutions that may be most affected by the development of AI include schools, which have to adapt to the digital age and integrate 21st century skills into their core curricula. According to Karsenty (2019), new forms of technology will occupy our lives and fascinate our children, in which case schools may have to make space for them. The main focus of this study is on how stakeholders from the fields of law, business, education, and engineering view this progress and anticipate the impact of AI on education. As a result, the aim of this study is to explore what the use of AI in school mathematics education means in schools and universities and what kind of implications it might have for the future of education.

## 1.1. Artificial Intelligence in Education

Henry Ford once claimed, "If I had asked people what they wanted, they would have said faster horses." Roll and Wylie (2016) emphasize this statement. On the surface, it appears that schools have transformed into "faster classes" that deliver outcomes more quickly. Will these "fast classes" do so in the twenty-first century or will new ways of thinking be required? Is it enough to teach students how to think critically and met cognitively as we approach the twenty-first century? Or should we set up brand-new, hitherto unimagined mechanisms for the modern era? What educational possibilities may artificial intelligence present that would set individuals apart from robots or intelligent vehicles and allow them to retain their social and emotional aspects? Most likely, these subjects will remain the top priority for decision-makers and practitioners in the sector; in fact, there are already arguments on whether or not instructors can really be replaced by AI (Felix, 2020).

According to Manyika et al. (2017), effective instructors will always be needed to lead classes that foster students' emotional intelligence, creativity, and communication. These writers assert that advancements in automation and artificial intelligence will actually make people more human. The use of artificial intelligence in education will make learning more individualized, provide effective learning experiences, allow students to discover their talents, improve their creativity, and reduce teachers' workload, according to Haseski (2019), who is discussing educational research on AI. However, there are also opposing viewpoints. Roles being switched around.

According to studies on artificial intelligence, exposing instructors to computers can be dangerous (Humble & Mozelius, 2019). States and countries must develop a teacher profile that will work with these support systems in order to be ready for this future (Wogu, Misra, Olu-Owolabi, Assibong & Udoh, 2018).

Although research on general artificial intelligence can be found dating back at least to the 14th century, it only recently gained popularity due to Alan Turing's work in 1937 (Humble & Mozelius, 2019). Despite this, studies on artificial intelligence in education have received a lot of attention recently. They are currently becoming into a significant topic in academic literature and scientific communities. As "artificial intelligence leadership" has started to be used in organizational management, we observe an expansion of AI research in that field. According to studies on artificial intelligence, exposing instructors to computers can be dangerous (Humble & Mozelius, 2019). States and countries must develop a teacher profile that will operate with these support systems in order to be ready for this future (Wogu, Misra, Olu-Owolabi, Assibong, & Udoh, explored in the literature; also Canbek, 2020).

There will be significant changes in the educational systems and procedures when artificial intelligence is used increasingly in education. Sekeroglu, Dimililer, and Tuncal (2019) made the following claim based on the study's

findings: "Artificial intelligence could help teachers improve personalized education for their students." People who are disadvantaged, members of underserved groups, individuals with impairments, refugees, dropouts, and residents of remote areas can all benefit from access to suitable and improved learning opportunities thanks to artificial intelligence (Pedro, Subosa, Rivas, & Valverde, 2019). According to research, intelligent learning environments and artificial intelligence techniques can help deliver personally personalized approaches more effectively (Mohammed & Watson, 2019). Although active involvement from human instructors seems to be necessary for excellent education, artificial intelligence envisions raising education and quality at all levels, notably through offering customization (Grosz & Stone, 2018). Pedro et al. (2019) highlight a dual-teacher model with artificial intelligence in terms of individualized education: teachers currently spend a lot of time on routine and other administrative tasks, such as repeating frequently and responding to questions about a variety of topics, but in-class assistants supported by artificial intelligence (secondary teachers) will reduce the time spent on routine procedures, which will help teachers focus on student guidance and one-to-one communication.

## 2. Research Method

The study design used a qualitative research approach known as phenomenology. When a comprehensive study of a topic or topic is desired, qualitative research is preferred (Creswell, 2013). Phenomenological study refers to studies that seek to understand the thoughts and meanings of specific people (Yildirim and Simsek, 2008). Hence, we made an effort to find out what participants think about the use of AI in education. A triangulated dataset was explored in this study, which investigated participants' views on the use of AI in mathematics education in schools and universities.

### 2.1. Participants

It was chosen to choose the participants using deliberate sampling. In order to achieve the goals of the study, a data-rich sample must be chosen (Buyukozturk, & Demirel, 2018). Researchers have identified four target groups for artificial intelligence in education, Totaling 19 individuals.

University teachers who are now employed in University (5 persons); Academicians; Academics working in the field of educational sciences (5 people), Four professionals in the field of artificial intelligence who work for either corporate or public institutions. Teachers; there are presently (5 persons) (5 teachers) working in public schools to protect the participants' identities, the findings were provided using tag names. Following were the names that were determined: Ahmed, sawsan, abdalh, Hatice, Erine, jamelh, Hussein, Ismail, haron. Was selected to use purposeful sampling to choose the participants. A data-rich sample must be selected in order to meet the objectives of the study (Buyukozturk, Cakmak, Akgun, Karadeniz & Demirel, 2018). Four target groups comprising 18 people have been identified by researchers for the use of artificial intelligence in education:

Academicians; Academics working in the field of Educational Sciences (5 individuals); Four specialists in the field of artificial intelligence who work for either corporate or governmental organizations. University teachers, who are now employed in University (5 people).

### 2.2. Collection of Data and Analysis

In the study, semi-structured interviews were used. The participants were asked a number of questions through the internet, including what they think of AI, how it will be integrated into education, the future outlook, and the positive and negative implications they have on AI in education. Participant's perspectives about the employment of artificial intelligence in education were examined using their responses to the aforementioned questions.

Three specialists in the field of educational sciences were consulted in the preparation of the research's questionnaires, which will be used to gauge the opinions of the participants. The participants initially completed an online form with the questions. Face-to-face interviews with the participants on what they stated on the form were

afterwards conducted in order to obtain more in-depth information on the topic. . In the initial data collection, it was believed that participants would be able to explain themselves more clearly in writing alone, but in the second optional face-to-face encounter, it became clear that the points the researchers had assumed needed further elaboration.

The content analysis approach was used to analyze all the data, from codes to more comprehensive topics. Here, line by line analysis of the data gathered from each participant is the goal. First, codes were created, which then gave rise to themes that are eventually equivalent to literary works. All the lines were considered throughout each stage of coding and while choosing the themes. The codes highlighted in the study (such as individualized teaching) were further explained in the results section. The participants' perspectives on AI are examined in light of their prior knowledge and awareness of the topic, keeping several scenarios in the back of their thoughts. As seen in Table 1, just one question (the last one) was coded using a predetermined number format.

## 2.3. Trustworthiness

Integrity is of utmost significance in qualitative research. A professional academician in the subject follows the data gathering, coding, tabulation, and reporting phases of qualitative research to ensure a more reliable approach is used in the study. The researchers also listed their first hypotheses on the issue. Participants were asked for their initial evaluations. An analyst triangulation was used to do a thorough study that was independent of three academics. The triangulation of data sources technique was applied (Streubert & Carpenter, 2011).

In order to enable viewpoint triangulation, we also sought to analyze a wide range of AI research from the health to the business sectors. Triangulation, according to Patton (1999), is the process of using many techniques or data sources in qualitative research to gain a thorough knowledge of instances or phenomena. the presence of professionals from various disciplines a large and varied data source was offered for the study on artificial intelligence in education. A thorough analysis of the data's consistency with earlier research in the literature was conducted. Data and findings from several data sources were provided in order to compare the content. Prejudices among the researchers were downplayed. Raw data and versions that have been evaluated are saved for potential future controls. The participants were given a thorough explanation of the working procedure, goal, and methodology. Transferability was thoroughly described in relation to both the individuals and the process. They were briefed about the rules of ethics and that they might leave the research whenever they wanted.

## 3. FINDINGS

The main topics identified in this section are based on learning mathematics in schools and universities, the use of artificial intelligence, its impact on education and the benefit from it, which the participants emphasized most. Participants from various groups, especially students studying in schools and universities, were asked to study mathematics majors. When the data was analyzed, it became clear that the participants gave priority to the scientific subject used for artificial intelligence and the results that artificial intelligence will bring to our daily lives. All other topics are discussed. Participants discussed a wide range of topics under headings under the pros, cons, advantages, and ideas of using artificial intelligence. We have tried to provide some general quotes under each heading that summarize this issue.

## 3.1. Products (Outcomes)

Participants' expectations for quality results and goods in the education sector were perceived as being expressed under this subject. We provided a list of potential educational items and results under the "products" component. In addition to actual tools, the range of items also includes software, systems, methodologies, and models. The following is a list of artificial intelligence-based items that would stand out or may be significant in education.

### 3.2. Software with Advanced Technologies

Individualized education (refers to individualized instruction), Simulations for education and lessons,  Scenario and case study-producing systems,  Interest, ability, and needs analysis systems, Vocational guidance systems (for career choice), Robot assistants and robot teachers, Smart classes in schools,  Programs or tools for recording attendance; various unmanned systems, Personal teaching tools; Attention and distraction analysis system; Academic achievement detection and recommendation system for development; Learning result detection system (for levels of students), Curriculum editing software; Systems that recognize and report students' learning patterns; Learning systems in cloud settings and virtual learning environments.

One participant, hashm, an academician, supported the products/outcomes topic by saying, Artificial intelligence in education can be used in many areas from individual learning, examination opportunities, face recognition system, to taking attendance at the entrance to the class. And highlighted resources for individualized learning. A doctor by the name of hamzh also said providing individualized education by virtualizing teaching through artificial intelligence." Additionally, salma, a skilled engineer, claimed that by creating machine learning algorithms related to the educational system, curriculum planning can be left to artificial intelligence mechanisms.

### 3.3. Drawbacks

The potential dangers and drawbacks of using artificial intelligence in education were discussed in this subject. According to the participants, the following are these drawbacks, Individuals' mechanical thinking, which stifles intuition a utilitarian or pragmatic viewpoint might take the place of humanistic principles; Worst-case possibilities include comprehensive student evaluations.

The lack of human interaction in education, the information-oriented human type, the potential use of unrestrained intelligence technology in education (such as data security), and the harm done to interpersonal connections. In the interviews, participants individually indicated potential risks and disadvantages. There are anticipated dangers, particularly for participation teachers. Ayşe, a teacher, has the opinion that artificial intelligence will increase its dominance over the world. Academician Ali said that mechanical-thinking, machine-human style people were waiting for us. I believe that we won't need teachers in the distant future, says salameh, a teacher. Burak, a lawyer, had similar views to those of teachers when he said Artificial intelligence will take over all educational tasks; even a teacher may not be needed. The consequences of dystopic robot movies and other popular media, which some participants thought would come true, are among the potential reasons of these worries.

### 3.4. Benefits

The findings of the participants' perspectives regarding the advantages of utilizing artificial intelligence in education are discussed in this subject. As a result, these advantages are People measurement or measuring people, assisting individuals in learning at their own pace, accurately identifying the needs of the individual, Realistic solutions to persistent issues. There will be less paperwork in schools, which will save time wasted, improves education quality, make work easier, and aid in making wise decisions through quick data analysis. The ability to train in smaller groups with effective planning, A more effective individual learning process, Aiding policymakers, for example, population prediction simulations for making the right education investments in the right places

As a benefit of artificial intelligence, the student's information can be monitored, evaluated, and planning can be made about which profession that student should concentrate on in the future," claimed Smail (an academician). Elif, a skilled engineer who participated in the study, advised the researchers to regularly report on students' situations at school, create suggestions based on these reports, and share with relevant people. A doctor named Khalil asserted that "artificial intelligence tools can help in evaluating the results of exams, student movements, and student communication. An AI tool may evaluate the voice of pupils, gauge how much they have learnt, and provide supporting

or commands in accordance, according to faten (a teacher). These participant opinions are strongly connected to the potential advantages of "learning." In the literature.

### 3.5. Suggestions

Participants' ideas for utilizing artificial intelligence in education were featured in this subject. The following are these advices:

1.  When utilizing artificial intelligence in education, a specific measurement method should be in place
2.  Pilot applications should be used to evaluate any apps or systems for artificial intelligence in education before they are integrated into the overall system.
3.  The developed systems should be the subject of academic research and analysis.
4.  Work on the necessary infrastructure should be done.
5.  A method for auditing should be implemented.
6.  It's important to consider human psychology.
7.  Software that is supportive and preventive should be created.
8.  It's important to examine how artificial intelligence-related technologies affect people's ability to make decisions in their daily lives.
9.  The integration of AI should go forward in a way that doesn't interfere with social interactions. Negatively.
10. Artificial intelligence in education should only be utilized where it is necessary and is not a complete answer.
11. The process ought to be conducted in an interdisciplinary manner with participation from all parties, not only educators and engineers.

Hattie, a teacher, stated that, at this stage, "AI should be preferred only for the areas that are needed; there must be a conscious use of AI." Academician hash said, "We must be cautious when moving forward. Studies in academia are possible. Running pilot apps is crucial. The overall framework was described as follows by Kubra, a skilled engineer: "Artificial intelligence should not be in the center [sic] of educational activities; it should operate as a helpful element, play a supporting role for teachers and the human aspect. AI systems should be properly integrated with human control to reduce hazards.

It is crucial that this entire process is carried out on human beings since they are the ones who are most impacted by technology. A legal foundation to prevent damage to anybody. The disadvantages may be reduced if it were founded on formal laws, according to Recep (a lawyer). Mehmet, a lawyer, expressed his views on data privacy in relation to legal matters, saying that "the storage, protection, and confidentiality of personal data in coming AI systems must be essential; individuals are particularly concerned with mental analysis, and a measurement of persons will lead an entire life to be exposed." Two steps should be taken to remedy this problem:

1.  To build the infrastructure required for the state to fulfill this duty and grant relevant bodies access under rigorous guidelines.
2.  To avoid a breach of confidentiality and to remediate it as quickly and damage-free as possible, States ought to impose deterrent sanctions.

How do you describe AI tools in education when artificial intelligence-supported educational settings are taken into account?

Was one of the last questions addressed to the attendees. Please indicating in percentage terms if AI is a good thing or a concern? Participants were asked to rate the amount of good and bad they saw in the integration of AI into society and education, with an equal emphasis on advantages and disadvantages. Table 1 displays how the groups distributed their responses to this question.

**Table 1. Distribution of benefit - drawback percentages by groups**

| Groups Benefit | Average | Drawback Average |
|---|---|---|
| Academician's | % 55.00 | % 43.00 |
| University personal | % 73.20 | % 26.80 |
| Expert Engineers | % 94.00 | % 5.10 |
| Teacher's | % 61.00 | % 37.00 |
| General | % 67.67 | % 32.33 |

In this regard, it may be claimed that participants had a generally favorable outlook on AI breakthroughs. While they appear to acknowledge the advantages of teaching procedures, academics may have analyzed the potential advantages and disadvantages of teaching only in terms of teaching professions and may have identified potential issues in the instructors' future. Expert engineers, on the other hand, said that AI will improve the educational system and help everyone in terms of systems.

## CONCLUSIONS

Core themes about AI in education were generated from participant interviews, along with one descriptive theme. Address future powerful media, applications, or AI outcomes. These programs included simulation software, systems to enable assessment and testing, virtual reality lessons, robotic assistants, and one-to-one learning systems. One of the most controversial issues about the impending impacts of artificial intelligence is how its tools will impact personalized learning. According to Chang and Lu (2019), AI in education can provide powerful technological support for individual learning. Adaptive learning, personalization and learning styles were identified as the main core nodes and ideas by Goksel and Bozkurt (2019) after analyzing publications related to education and AI studies. In light of this, a one-size-fits-all application of AI in education could replace the current method with personalized learning for each learner. Hence, we can conclude that educational progress can meet the needs of optimal learning using artificial intelligence and its accompanying technologies, which will be of tremendous assistance in helping teachers and students. In this context, Abdel Salam (2014) proposed an intelligent teaching system (ITS) based on the mastery learning approach.

Risks and drawbacks were the second topic. According to the study participants, the widespread use of artificial intelligence will lead to an overly mechanical approach to information processing, a practical approach, a greater emphasis on knowledge rather than aesthetic feelings, less space for teachers, ethical and security issues, and harmful social impacts. In interactions. Currently, unregulated, inappropriate, or excessive mobile phone use has already been linked to behavioral, social, and emotional issues (Choliz, 2010). It is worth noting that mobile devices have already robbed people of their social relationships, and they are especially wondering what is next with the development of artificial intelligence in the mobile environment, which may exacerbate the matter with the unconscious integration of artificial intelligence into human lives and phones.

Expect that assistive robots will take up more space in classrooms than teachers in the future. According to these findings, Picciano (2019) believes that the bulk of individuals who lose their jobs will work in managerial and professional fields including education, law, medicine, and business. One of the most common concerns regarding AI in society is a declining workforce. Picciano (2019) also suggests that instead of AI or robots taking over human work, it will be humans with the skills to operate intelligent systems who will prevail over those who lack them. Rule and Willey (2016) believe that teaching in the current situation will no longer be the same; As a result, teachers must take on the responsibilities of mentors, teach their students life skills, interact, venture outside the comfort zone, and focus on real-world issues.

Although we have not yet reached the level of artificial intelligence depicted in TV shows, this progress is accelerating. A recurring theme in participants' comments, both from the film score and from Isaac Asimov's I, Robot and its film adaptation, is related to social phobia of gadgets. Some attendees referred to Isaac Asimov's "Laws of Robotics," which are included here (Asimov, 2004):

1.    A robot may not harm a human being, or allow a human being to be injured, through its inactivity, unless this is necessary to avoid causing greater harm to humanity as a whole.

2.    A robot must follow any instructions given to it by humans, unless doing so would violate the First Law or further endanger humanity.

3.    A robot must maintain its existence, as long as doing so does not violate the First or Second Law or lead to further harm to all of humanity.

Later, the zeroth law was created. A robot may not intentionally cause harm to people or may do so through inactivity.

"Proportionality" is a strong focus on preventing danger from AI systems. Academics, engineers and other professionals involved advise that AI and similar technologies be used carefully up to this point.

The advantages of artificial intelligence this topic is similar to the first topic listed under "solid results," but it differs in that it is more concerned with uses and functions. Study participants believe that AI-powered systems will help materials keep up with learners' learning rates, help systems better identify learners' requirements, stop wasting time and resources, and make it possible to quickly analyze data and make the right decisions. For example, one participant believes that AI is particularly useful because it may influence countries to invest in relevant sectors by predicting population migration. According to Subramanian and Swathi (2018), incorporating predictive c

## Suggestions

Proposals for using artificial intelligence in education. It is certain that with the introduction of artificial intelligence into mathematics in Jordanian schools and universities, there will be advantages, disadvantages, and risks relevant to schools. Participants believe that AI will give students and learners new opportunities for the majority that may not be available in traditional classrooms or educational technologies. However, there may be problems. To do their homework before the next industrial revolution, schools need to be proactive. Policy makers should follow recommendations in the literature if they want to reap the benefits of AI in education. The policy applies to both the public and private sectors, as well as to national and international organizations, civil society groups and individuals who either create or provide artificial intelligence-based services and technologies within Jordan.

## REFERENCES

[1]    Abdelsalam, U. M. (2019, March). A proposal model of developing intelligent tutoring systems based on mastery learning. Paper presented the Third International Conference on E-Learning in Education (pp. 106–118). Retrieved from http://paper.researchbib.com/view/paper/14102

[2]    Asimov, I. (2014). I, Robot. New York: Bantam Books.

[3]    Buyukozturk, S., Cakmak, E. K., Akgun, O. E., Karadeniz, S., & Demirel, F. (2022). Bilimsel araştırma yöntemleri [Scientific research methods]. Ankara: Pegem A Yayıncılık.

[4]    Canbek, M. (2022). Artificial Intelligence Leadership: Imitating Mintzberg's Managerial Roles. In Business Management and Communication Perspectives in Industry 4.0 (pp. 173–187). IGI Global.

[5]    Chang, J., & Lu, X. (2021, August). The study on students' participation in personalized learning under the background of artificial intelligence. In 10th International Conference on Information Technology in Medicine and Education (ITME) (pp. 555-558). IEEE.

[6]    Choliz, M. (2020). Mobile phone addiction: a point of issue. Addiction, 105(2), pp. 373–374.

[7]    Creswell, J. W. (2023). Qualitative inquiry and research design: Choosing among five approaches, SAGE publications Felix, C.V. (2020). The Role of the Teacher and AI in Education. Sengupta, E., Blessinger, P. and Makhanya, M.S. (Ed.)

[8]    International Perspectives on the Role of Technology in Humanizing Higher Education (Innovations in Higher Education Teaching and Learning, Vol. 33), Emerald Publishing Limited, pp. 33–48. https://doi.org /10.1108/S2055- 364120200000033003

[9]    Goksel, N., & Bozkurt, A. (2019). Artificial intelligence in education: current insights and future perspectives. In S. Sisman-Ugur & G. Kurubacak (Eds.), Handbook of Research on Learning in the Age of Transhumanism (pp. 224– 236). Hershey, PA: IGI Global.

[10]    Grosz, B. J., & Stone, P. (2018). A century-long commitment to assessing artificial intelligence and its impact on society. Communications of the ACM, 61(12), pp. 68–73.

[11]    Golic, Z. (2019). Finance and artificial intelligence: The fifth industrial revolution and its impact on the financial sector. Zbornik radova Ekonomskog fakulteta u Istočnom Sarajevu, (19), pp. 67–81.

[12]    Haseski. H.I. (2019). What do Turkish pre-service teachers think about artificial intelligence? International Journal of Computer Science Education in Schools, 3(2), Doi: 10.21585/ijcses.v3i2.55

[13] Humble, N., & Mozelius, P. (2019, October). Artificial Intelligence in Education-a Promise, a Threat or Hype? In European Conference on the Impact of Artificial Intelligence and Robotics 2019 (ECIAIR 2019), Oxford, UK (pp. 149–156). Academic Conferences and Publishing International Limited.

[14] Karsenti, T. (2019). Artificial intelligence in education: the urgent need to prepare teachers for tomorrow's Schools. Formation ET profession, 27(1), pp. 112–116. Doi:10.18162/fp.2019.a166 .

[15] Long, P., & Siemens, G. (2011). Penetrating the fog: Analytics in learning and education. EDUCAUSE Review, 46(5), pp. 31–40.

[16] Manyika, J., Chui, M., Miremadi, M., Bughin, J., George, K., Willmott, P., & Dewhurst, M. (2017). A future that works: Automation, employment, and productivity. Chicago: McKinsey Global Institute.

[17] Mohammed P.S. & Watson E. N. (2019). Towards inclusive education in the age of artificial intelligence: perspectives, challenges, and opportunities. In: Knox J., Wang Y., Gallagher M. (Eds) Artificial Intelligence and Inclusive Education. Perspectives on Rethinking and Reforming Education. Singapore: Springer. https://doi.org/10.1007/978- 981-13-8161-42

[18] Mou, X. (2019). Artificial intelligence: investment trends and selected industry uses. EMCompass; No. 71. Washington, D.C.: World Bank Group.

[19] Ng, A. (2017, January 25). Artificial intelligence is the new electricity. Speech presented at Stanford MSx Future Forum in California, Stanford. https://www.youtube.com/watch?v=21EiKfQYZXc .

[20] Patton, M. Q. (1999). Enhancing the quality and credibility of qualitative analysis. Health services research, 34(5/2), pp.1189–1208.

[21] Pedro, F., Subosa, M., Rivas, A., & Valverde, P. (2019). Artificial intelligence in education: Challenges and opportunities for sustainable development. Paris: UNESCO.

[22] Picciano, A. (2019). Artificial intelligence and the academy's loss of purpose. Online Learning, 23(3), Doi:10.24059/olj.v23i3.2023

[23] PwC. (2017). Sizing the prize what's the real value of AI for your business and how can you capitalise? Retrieved from https://www.pwc.com/gx/en/issues/analytics/assets/pwc-ai-analysis-sizing-the-prize-report.pdf.

[24] Roll, I., & Wylie, R. (2016). Evolution and revolution in artificial intelligence in education. International Journal of Artificial Intelligence in Education, 26(2), pp. 582–599.

[25] Sekeroglu, B., Dimililer, K., & Tuncal, K. (2019). Artificial intelligence in education: application in student performance evaluation. Dilemas Contemporáneos: Educación, Política y Valores, 7(1), pp. 1–21.

[26] Streubert, H. J., & Carpenter, D. R. (2011). Qualitative research in nursing. (5th ed.). Philadelphia: Lippincott Williams and Wilkins.

[27] Subrahmanyam, V. V., & Swathi, K. (2018). Artificial intelligence and its implications in education. In Int. Conf. Improv. Access to Distance High. Educ. Focus Underserved Communities Uncovered Reg. Kakatiya University (pp. 1–11).

[28] Timms, M. J. (2016). Letting artificial intelligence in education out of the box: educational cobots and smart classrooms. International Journal of Artificial Intelligence in Education, 26(2), pp. 701–712, Doi: 10.1007/s40593- 016-0095-y

[29] Wartman, S. A., & Combs, C. D. (2018). Medical education must move from the information age to the age of artificial intelligence. Academic Medicine, 93(8), pp. 1107–1109.

[30] Wogu, I. A. P., Misra, S., Olu-Owolabi, E. F., Assibong, P. A... & Udoh, O. D. (2018). Artificial intelligence, artificial teachers and the fate of learners in the 21st century education sector: Implications for theory and practice. International Journal of Pure and Applied Mathematics, 119(16), pp. 2245–2259.

[31] Yildirim, A., & Simsek, H. (2008). Sosyal bilimlerde nitel araştırma yontemleri [Qualitative research methods in the social sciences]. Ankara: Seckin Publication.

[32] Jordan Artifice ialIntelligence Policy (2023) https://www.modee.gov.jo/ebv4.0/root_storage/en/eb_list_page/ai_final_-_english_version.pdf