

The Effect Of The Artificial Intelligence On Learning Quality & Practices In Higher Education

Dr. Mohammad Irshad Hussain¹, Dr. Mohd Shamim², Dr. Ravi Sankar AV³, Dr. Munendra Kumar⁴, Kaushik Samanta⁵, D. T. Sakhare⁶

¹Assistant Professor, Department of Teacher Education, Halim Muslim PG College, Chamanganj, Kanpur, UP, India, irshad218@gmail.com

²Assistant Professor, Department of English, Halim Muslim PG College, Chamanganj, Kanpur, UP, India, shamimmohd2009@gmail.com

³Assistant Professor (Psychology), Department of Humanities and Social Sciences, Graphic Era (Deemed To Be) University, Dehradun, drravisankar1974@gmail.com

⁴Professor and Head, Department of Education Kishan Institute of Teachers Education, (Affiliated by CCS University Meerut), Meerut (UP), drrmunendra2013@gmail.com

⁵FICS Lecturer, Marine Transport and Engineering, Higher Colleges of Technology Abu Dhabi, hikaushik23@gmail.com

⁶Assistant Professor, Department of Chemistry U.G., P.G. & Research Centre, Department of Chemistry, Shivaji Art's, Comm. & Science College Kannad, Dist. Aurangabad, 431103, Maharashtra, sakharedhondiram@yahoo.com

Abstract

Computers have been employed in the field of education for many years. However, recent and current research within the field of artificial intelligence (AI) is having a positive impact on education. For example, there now exist ICAI (intelligent computer-assisted instruction) systems to teach or tutor many different subjects; several such systems are discussed herein. In addition to CAI (computer-assisted instruction) systems, we discuss the development of learning environments that are designed to facilitate student-initiated learning. A third major application is the use of expert systems to assist with educational diagnosis and assessment. During the course of our discussion of these three major application areas, we indicate where AI has already played a major role in the development of such systems and where further research is required in order to overcome current limitations. AI is perceived as a bane and also a boon to the education system and to the human intellect. Optimistic utilization of AI in the classrooms is highly recommended by both teacher and student participants. It is also identified that majority of the teachers are more adaptable to embrace new technological changes than students. Further study on generation and geographic diversity based teacher and student perceptions may support more effective implementation of AI in education.

Keywords: Education, Artificial intelligence, computer-assisted instruction

Introduction

Teaching and learning process is happening since ages. Students' and teachers' performance is estimated on the basis of many criteria. In general, a teacher evaluates a student on certain predetermined grounds like

discipline, creativity, participation in extra-curricular activities, learning speed, obedience towards teachers, etc. amongst which the "student's attention to subjects and his ability to replicate his understanding in the exams" occupies the first place in the list. MARKS/GRADES for the student's subject

knowledge stand first in the list due to many reasons. One of the most important reasons is the feasibility a teacher has to evaluate a student based on his answers to the questions within a given time-frame. Measuring other aspects in them need an exhaustive effort from teachers who are already enough occupied with their professional and personal work. To measure these other skills, in most cases, teachers use their preconceived perceptions to finish their evaluation process with ease. Hence, the grades of a student can be hardly relied upon to assess his actual skills, knowledge and abilities. Students evaluate teachers based on their ability to communicate

with the students, subject knowledge, empathy levels, and many other factors. In most cases, students give preference to be teacher's pet and teachers are always blamed for being biased towards some students. This may generally happen when the students fail to grab teacher's attention to them. Introduction As illustrated by Henry Ford in the analogy, innovation does not mean working that the society should work only with what has been the norm, such as finding ways of making horses faster.



Figure 1: AI in Education

Sometimes, it is necessary to search beyond the norm, develop new ways of doing things. Instead of making horses faster, build the automobile, which will be faster than the horse and take a person from Point A to Point B faster. These principles and approaches have driven the rapid developments in technology experienced over the years, particularly in the education sector. The introduction, advancements, and proliferation of technology, more particularly, artificial intelligence, has made it easier for instructors to dispense their duties more effectively and efficiently. Prior to the introduction of computers and other related technologies, instructors and students, engaged in instructions and learning mechanically, or through the pure application of

natural human effort. With the introduction of microcomputers, and by extension, personal computers in the 1970s, which according to Flamm, provided more computing power and marked important transition to electronic computers for the mass market [1]. In agreement, Campbell Kelly opined that with developments of the electronic computers more particularly, and the availability of the same for different entities across different sectors of the economy, was precipitated by the developments of personal computers in the 1970s [2]. Personal computers development made it possible for individuals and other non-governmental entities to own and use computers for different reasons. These transitions harbingered the proliferation of computers in different sectors of the economy and society.

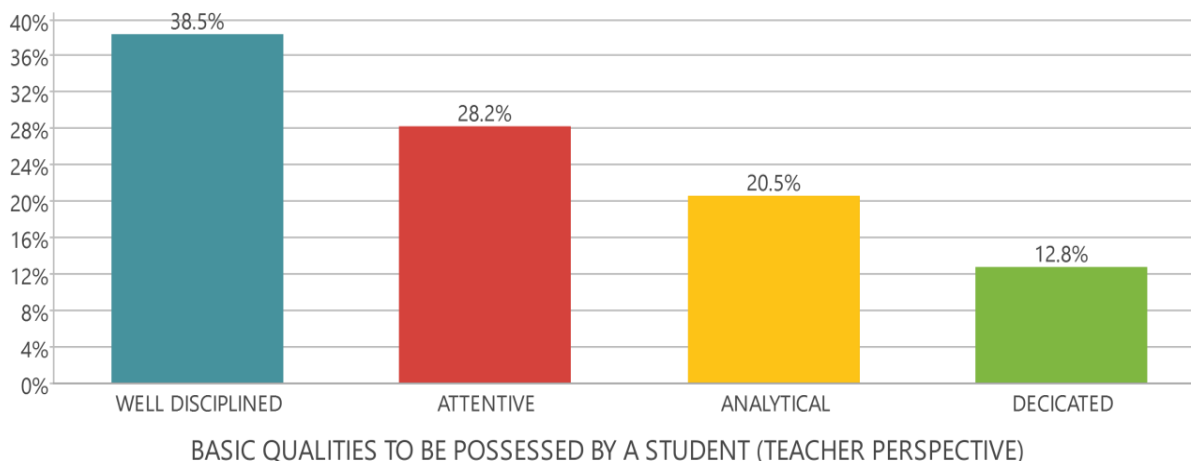


Figure 2: Teacher’s perspective on the basic qualities to be possessed by a student

Computer and information communication technologies have over the years continued to evolve, leading to the development of artificial intelligence. Artificial intelligence, according to Coppin, is the ability of machines to adapt to new situations, deal with emerging situations, solve problems, answer questions, device plans, and perform various other functions that require some level of intelligence typically evident in human beings [4]. In another definition, Whitby defined artificial intelligence as the study of intelligence behavior in human beings, animals, and machines and endeavoring to engineer such behavior into an artifact, such as computers and computer-related technologies [5]. Drawing from these definitions, it is evident that artificial intelligence is the culmination of computers, computer-related technologies, machines, and information communication technology innovations and developments, giving computers the ability to perform near or human-like functions. In line with the adoption and use of new technologies in education, artificial intelligence has also been extensively leveraged in the education sector. [6]

A. Artificial Intelligence In Current Education- The mention of artificial intelligence brings to mind a supercomputer, a computer with immense processing capabilities, including adaptive behavior, such as inclusion of sensors, and other capabilities, that enable it

to have human-like cognition and functional abilities, and indeed, which improve the supercomputers interaction with human beings. Indeed, different motion pictures have been made to showcase the abilities of AI, such as in smart buildings, such as the

Ability to manage air quality in a building, temperatures, and or playing music depending on the sensed mood of the occupants of the space. Within the education sector, there has been increased application of artificial intelligence, going over and above the conventional understanding of AI as a supercomputer to include embedded computer systems. For example, embedded into robots, AI, or computers and supporting equipment enable the creation of robots that improve the learning experience of the student, from the most basic unit of education, early childhood education. Indeed, Timms posited that cobots or the application of robots, working together with teachers or colleague robots (cobots) are being applied to teach children routine tasks, including spelling and pronunciation and adjusting to the students’ abilities [7]–[9]. Artificial intelligence in education, according to Chassignol et al. has been incorporated into administration, instruction or teaching, and learning [10]. These areas, which Chassignol et al. identify as the framework for analyzing and understanding artificial intelligence in education, will form the scope of this study.

B. Purpose of the Study- This study seeks to assess how the use of AI, in its different forms, in education, has impacted or affected different aspects of education. More particularly, the study will seek to assess how AI has affect teaching, learning, and administration and management areas of education. It is anticipated that the study will ascertain that AI has foster effectiveness and efficiency in the performance of administrative tasks in education, and overall fostered improved instructional and learning effectiveness in education. Search strings will be used to search different databases, including EBSCOhost, ProQuest, Web of Science. In addition, the key words and search strings are used to search Google Scholar to identify articles from different journals that have focused on researching the impact of AI on education.[11]

C. Technical Aspects of AI in Education-

AI-aided education includes intelligent education, innovative virtual learning, and data analysis and prediction. Major scenarios of AI in education and key technologies supporting are listed in Table 1. Note that AI-enable education is playing a more important role as learning requirements promotes [12]. Intelligent education systems provide timely and personalized instruction and feedback for both instructors and learners. They are designed to improve learning value and efficiency by multiple computing technologies, especially machine learning related technologies [13], which are closely related to statistics model.

AI Education Model- In AI learning system, learner model is critical for improving independent learning capabilities. It is established based on behavior data of learners generated from the learning process. Learners' thinking and capability is analyzed to assess their learning abilities. Then knowledge analysis are mapped to obtain learners' knowledge mastery. Learner modeling establishes connections between learning results and various factors including learning materials, resources and teaching behaviors [14]. Knowledge model establishes knowledge structure map with detailed learning contents, usually including expert knowledge,

rules of making mistakes often made by learners and misunderstanding [15]. Combining knowledge field model and learner model, teaching model determines the rules to access knowledge field, which enables instructors to tailor teaching strategies and actions. As education evolves, learners are likely to behavior positively, take actions or seek for help. AI system can always be prepared to offer aid from tutoring model's built-in teaching theories. User interface explains learners' performance through multiple input media (voice, typing and click) and provides output (texts, figures, cartoons and agencies). The advanced human machine interface provides AI-related functions including natural language interaction, speech recognition and learners' emotion detection. [16]

Methodology

An exploratory qualitative design is opted for this study. Structured open-ended questionnaires designed using Google Forms are used to collect data from teaching and student fraternity. As the aim of this study is to give more insights into trending educational strategies, exploratory research is opted.

Intelligent Education Technologies-

Machine learning, learning analytics, and data mining are closely related technologies for education. At present, two communities have evolved based on learning analytics and educational data mining. They overlap in objectives and techniques and benefit from a variety of disciplines, including machine learning, data mining, psychometrics of statistics, and data modelling [17]. The field of learning analytics is more focused on learning content management systems and large-scale test results. Data mining originates from the community of intelligent tutoring systems, work on very small scale cognition.

A. Learning: Sharma et al. observed that AI in education has taken the form of adaptive learning systems, intelligent tutoring systems, and other systems that improve the quality of administrative processes, instructions, and learning [18]. In agreement, Pokrivcakova

observed that in education, AI takes the form of intelligent systems with adaptive capabilities [19]. United Nations Education Scientific and Cultural Organization (UNESCO) observed, that AI has permeated various sectors of the society, more particularly, the education sector, as discussed for example, instructions or teaching methods, approaches, and tools [20]. From the analysis of the selected articles, another trend or application of AI in education is in the form of AI in web-based education. For example, Kahraman, Sagioglu, and Colak, in their study,

discussed the development and use of AI in education in the form of Adaptive and intelligent Web-based educational systems (AIWBES), which are fast replacing the simplistic leveraging and use of the Internet and the World Wide Web.[21]

AIWBES is the integration of AI principles and technology into web-based learning platforms, which improves the learners' experiences. Indeed, Peredo et al. also describe the integration of AI into web [22]

Origins of AIWBES Technologies

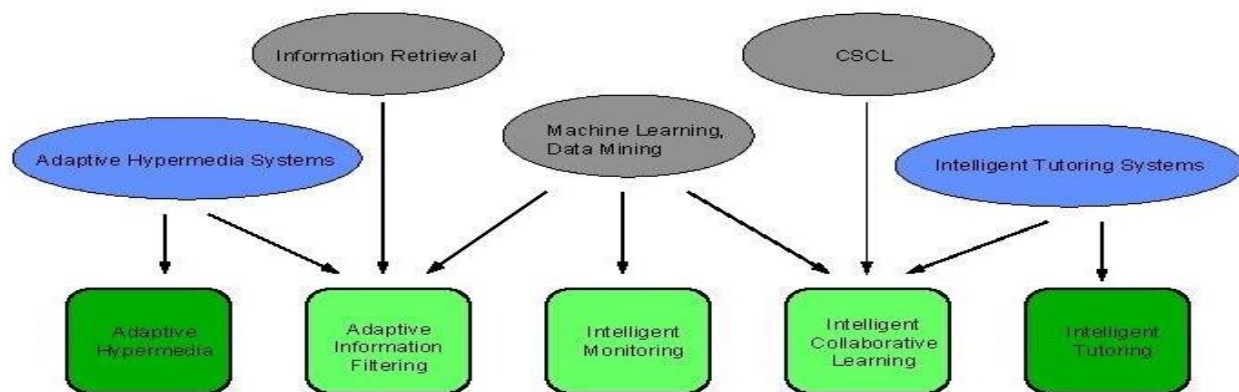


Figure 3: AI Technologies

Based platforms. They posited that intelligent web-based education (IWBE) has emerged as an important component of education, more so with the proliferation of online education. Rus et al. posited that intelligent tutoring systems (ITSs) perform a wide range of functions, including grading and providing students with feedback on their work [23]. Instructors, working with ITS achieve improved efficiencies in various administrative tasks, as well as their core responsibilities, providing guidance and instructions to help students excel in their studies.

B. Administration: AI has improved efficiencies in the performance of different administrative tasks that instructors, would require a lot of time to perform in the absence of AI. Other studies have also highlighted the integration of AI into machines or robots and

creation of powerful instructional tools and improvement of the quality of the applied pedagogical strategies. Indeed, Timms highlights that another key form of application of AI in education as an instruction tool is the integration of AI in education principles in robots, the development and use of robots as teacher assistants and colleagues, cobots, which can be used to undertake basic and even advanced teaching tasks, such as teaching students to read and pronounce words [24]. Indeed, Sharma et al. observed that the integration or the use of AI in education, more particularly, integration with other technologies and use as instructional tools, has resulted in the development and use of better teaching tools [25].

C. Instruction: An analysis of different articles showed rapid uptake and use of AI, in different forms for instructional purposes or as a

pedagogical tool by instructors. The use of AI for instructional purposes or as a pedagogical tool has had a major impact on this aspect of education. It has improved effectiveness, efficiency, and quality of the work done by instructors as adduced from the different publications reviewed and analyzed. Efficiency and quality within

D. This context, is measured by the delivery of the relevant content in line with the curriculum and in line with the learner specific needs and capabilities, while effectiveness is assessed by the implied uptake and retention or the achievement of learning by the students or the learners. Considering these operational definitions and description of efficiency, quality, and effectiveness, the findings of the study therefore indicate AI has fostered the realization of quality, effectiveness, and efficiency in instruction or teaching.

Result and Discussion:

From the different articles and studies reviewed, it is evident that with technological innovations and advancements, computers and computer related technologies, and other innovations have encouraged the development of artificial intelligence, which has permeated different sectors of the society, and will potentially have a major impact on different industries in which it is used. One of these areas in which AI has been applied, and is resulting in a major impact, is the education sector. As a foundation, and basis for understanding how AI has impacted education, a definition and description of AI was deemed essential. AI provides students with practical or experiential learning experiences, particularly when used together with other technologies, such as virtual reality, 3-D, gaming, and simulation, thereby improving the students' learning experiences. One study discussed or highlighted the adverse impact of AI, degradation of academic integrity and cheating using paper churning and paper mill services facilitated by AI. Most of the studies analyzed demonstrated and explained the different ways in which AI, including integration, benefits, and impact on

administration, instruction, and learning when used in education. The positive effects, the pros, outweigh the cons, or the negative effects.

Conclusion

Artificial Intelligence and its usage in different segments of our regular life seem to be increasing day-by-day and the same is reported in various studies. In the field of education, AI started making its mark by acting as an aid to support the teaching and learning process. The current study identified that both teachers and students needed more understanding on how the application of AI can benefit them in developing their teaching and learning abilities respectively. It also identified that an optimum utilization of this technology may yield better results. Majority of the participants opined that replacing a teacher with a robot can only degrade the present education system and that AI should only be a support to the regular teacher, except in few situations where it demands the role of complete technological intervention. Teachers seem more adaptable to the technological changes than students. Further research with a wider range of participants in different geographical locations and different age groups may bring in more inputs from teachers and students on the application of AI in education. The analysis focused on evaluating the impact of AI on administrative, instruction, and learning aspect of education, with a focus on assessing how AI has been applied and the effects it has had. AI in education initially took the form of computers and computer-related systems, and later, the form of web-based and online education platform. Embedded systems have made it possible to use robots, in the form of cobots or humanoid robots as teacher colleagues or independent instructors, as well as chatbots to perform teacher or instructor-like functions. The use of these platforms and tools have enabled or improved teacher effectiveness and efficiency, resulting in richer or improved instructional quality. Similarly, AI has provided students with improved learning experiences because AI has enabled the

customization and personalization of learning materials to the needs and capabilities of students. Overall, AI has had a major impact on education, particularly, on administration, instruction, and learning areas of the education sector or within the context of individual learning institutions.

References

- [1] K. Flamm, *Creating the Computer: Government, Industry, and High Technology*. Washington, DC, USA: Brookings Institution Press, 1988.
- [2] M. Campbell-Kelly, *Computer, Student Economy Edition: A History of the Information Machine*. Evanston, IL, USA: Routledge, 2018.
- [3] M. M. L. Cairns “Computers in education: The impact on schools and classrooms,” in *Life Schools Classrooms*. Singapore: Springer, 2017, pp. 603–617.
- [4] B. Coppin, *Artificial Intelligence Illuminated*. Boston, MA, USA: Jones and Bartlett, 2004.
- [5] B. Whitby, *Artificial Intelligence: A Beginner’s Guide*. Oxford, U.K.: Oneworld, 2008.
- [6] V. Devedžic, “Web intelligence and artificial intelligence in education,” *Educ. Technol. Soc.*, vol. 7, no. 4, pp. 29–39, 2004.
- [7] M. J. Timms, “Letting artificial intelligence in education out of the box: Educational cobots and smart classrooms,” *Int. J. Artif. Intell. Edu.*, vol. 26, no. 2, pp. 701–712, Jan. 2016.
- [8] H. Snyder, “Literature review as a research methodology: An overview and guidelines,” *J. Bus. Res.*, vol. 104, pp. 333–339, Nov. 2019.
- [9] Y. Fang, P. Chen, G. Cai, F. C. M. Lau, S. C. Liew, and G. Han, “Outage-limit-approaching channel coding for future wireless communications: Root-protograph low-density parity-check codes,” *IEEE Veh. Technol. Mag.*, vol. 14, no. 2, pp. 85–93, Jun. 2019.
- [10] M. Vaismoradi, H. Turunen, and T. Bondas, “Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study,” *Nursing Health Sci.*, vol. 15, no. 3, pp. 398–405, Mar. 2013.
- [11] M. Chassignol, A. Khoroshavin, A. Klimova, and A. Bilyatdinova, “Artificial intelligence trends in education: A narrative overview,” *Procedia Comput. Sci.*, vol. 136, pp. 16–24, Jan. 2018.
- [12] V. Rus, S. D’Mello, X. Hu, and A. Graesser, “Recent advances in conversational intelligent tutoring systems,” *AI Mag.*, vol. 34, no. 3, pp. 42–54, Sep. 2013.
- [13] R. C. Sharma, P. Kawachi, and A. Bozkurt, “The landscape of artificial intelligence in open, online and distance education: Promises and concerns,” *Asian J. Distance Educ.*, vol. 14, no. 2, pp. 1–2, 2019.
- [14] S. Pokrivcakova, “Preparing teachers for the application of AI-powered technologies in foreign language education,” *J. Lang. Cultural Edu.*, vol. 7, no. 3, pp. 135–153, Dec. 2019.
- [15] T. A. Mikropoulos and A. Natsis, “Educational virtual environments: A ten-year review of empirical research (1999–2009),” *Comput. Edu.*, vol. 56, no. 3, pp. 769–780, Apr. 2011.
- [16] (2019). United Nations Education Scientific and Cultural Organization (UNESCO). How Can Artificial Intelligence Enhance Education? [Online]. Available: <https://en.unesco.org/news/how-can-artificialintelligence-enhance-education>
- [17] S. A. Wartman and C. D. Combs, “Medical education must move from the information age to the age of artificial intelligence,” *Acad. Med.*, vol. 93, no. 8, pp. 1107–1109, Aug. 2018.
- [18] H. T. Kahraman, S. Sagioglu, and I. Colak, “Development of adaptive and intelligent Web-based educational systems,” in *Proc. 4th Int. Conf. Appl. Inf. Commun.*

Technol., Oct. 2010, pp. 1–5.

[19] R. Peredo, A. Canales, A. Menchaca, and I. Peredo, “Intelligent Webbased education system for adaptive learning,” *Expert Syst. Appl.*, vol. 38, no. 12, pp. 14690–14702, Nov. 2011.

[20] P. Phobun and V. J. , “Adaptive intelligent tutoring systems for e-learning systems,” *Procedia-Social Behav. Sci.*, vol. 2, no. 2, pp. 4064–4069, 2010.

[21] I. Roll and R. Wylie, “Evolution and revolution in artificial intelligence in education,” *Int. J. Artif. Intell. Edu.*, vol. 26, no. 2, pp. 582–599, Feb. 2016.

[22] Surjandy, W. Suparta, A. Trisetyarso, C. H. Kang, and B. S. Abbas, “Warding off the plagiarism with the applications (Case study at Bina Nusantara university student and faculty member),” in *Proc. Int. Conf. Inf. Commun. Technol. (ICOIACT)*, Mar. 2018, pp. 511–514.

[23] H. Sutton, “Minimize online cheating through proctoring, consequences,” *Recruiting Retaining Adult Learners*, vol. 21, no. 5, pp. 1–5, Jan. 2019.

[24] R. F. Murphy, “Artificial intelligence applications to support K–12 teachers and teaching,” *RAND Corp.*, Santa Monica, CA, USA, Tech. Rep. PE135, 2019, doi:

10.7249/PE315.

[25] S. Kiesler, R. E. Kraut, K. R. Koedinger, V. Aleven, and B. M. McLaren, “Gamification in education: What, how, why bother,” *Academic exchange quarterly*, vol. 15, no. 2, pp. 1–5, 2011.

[26] Pooja Nagpal., Namitha Rajput, et al., (2021), An inclusive systematic investigation of human resource management practice in harnessing human capital. *Materials Today: Proceedings*, 2021, ISSN 2214-7853, <https://doi.org/10.1016/j.matpr.2021.07.362>.

[27] Pooja Nagpal., Kiran Kumar., A.C. & Ravindra., H.V. (2020). Employee Engagement - Impact of Demographic Variables in Indian IT Sector. *Purakala31* (32), 136-142. ISSN: 0971-2143.

[28] Pooja Nagpal., & Kiran Kumar., A.C. (2020). High Performance Work Practices, Role of Engagement and its Outcomes- A Review of Literature Approach. *Studies in Indian Place Names*, 40(56), 326-337. ISSN: 2394-3114.

[29] Pooja Nagpal., & Kiran Kumar., A.C. (2019). The Effect of Perceived High Performance Work Practices on Employee Engagement -An Empirical Study on IT Firms in India. *Think India Journal*, 22 (43), 272-278. ISSN: 0971-1260