

General View about an Artificial Intelligence Technology in Education Domain

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Abstract: This paper discusses the topic of artificial intelligence creation and usage of higher education and research. AI explores how technologies to train, teach and build new pieces of knowledge from continuous development. This study illustrates the need to predict the incorporates artificial intelligence in the higher educational institutions, recent technical advances, and the increased rate of higher education adoption of AI technology addressed. The method used through the reviewing of existing studies and the type of AI proposed in each class, what kind of challenges faced. The study came outs with highlights the AI advantages with machine learning, technologies of educational sector, and enhancing the communication and security of data transformation among students. The result reveals how can be introducing these teaching, learning, student support, and management technologies with AI development. This study concludes to identify the challenges of applying AI in higher education institutions and student learning and discuss more directions for research.

1 INTRODUCTION

The use of the technology of AI in education has a long tradition history (Abdullahi, 2011). Regarding the digital technology revolutions, were introduced in the classroom as a pivotal point to convert the education with AI from archives digital information records (Noble, 2017). It began in the 1980s as desk-top computers implemented into school. All school capillaries have invaded through digitalization. Through global networks, integrated machines, innumerable teaching, and material approaches and automated student surveillance and other administration processes have become available for the student via the internet. This new stage of technology use needs a lot of controlling applications, also, need to AI engine to cluster them, organize and be on the right classification and more other resources to be existence for HEI (Tawafak, Abir, Ghaliya, Maryam, Sohail, and Jasiya, 2019).

The amount of data produced by digital devices and their processing capacity has expanded exponentially in tandem with the growth of digital technologies and their improved accessibility (AlFarsi, & ALSinani, 2017; Malik, Al-Emran, Mathew, Tawafak, and

AlFarsi, 2020). It is increasingly contributing to the introduction of smart systems capable of understanding trends in large volumes of data and increasingly capable of imitating human behaviour, especially human reasoning. Therefore, such programs may execute tasks individually or assist users in carrying out assignments.

The impact of AI from a socio-technical perspective on education explored in this study. First of all, we review the essential technologies that enable AI, particularly machine learning. This section describes the features of schooling AI systems. The ethical impact of such AI programs is assessed (AlFarsi, Jabbar,., & ALSinani, 2018).

One of AI advantages: Artificial intelligence (AI), deep learning, machine learning, and neural networks represent an incredibly exciting and powerful machine learning-based techniques used to solve many real-world problems.

Artificial Intelligence is adopted by several higher education institutions which improve the learning development of students by increasing the interests and motivations of students towards learning goals as per their interests and field of study (Hurtado, Miley, Clayton-Pedersen, and Allen, 1999).

On the other hand, some disadvantages also there. Along with the benefits of Artificial Intelligence and its application in students learning some limitations can be faced by students in this technological mode of learning (Eldow et al., 2006; Mathew et al., 2019; Terekhov, 2017). One of the significant limitations of Artificial Intelligence in students learning that only manipulates the results from a given set of data, unlike teacher instructions, it only shows the instructions as per limited datasets. As teachers can become more experienced as per the number of years in their field, but AI-based instructions remain the same according to their algorithms. Some researches emphasize on technology addiction in students as they become addicted to getting the solution on fingertips via algorithms and AI applications. Hence, they become dump in self problem-solving matters, in other words so much use of technology can result as a shrink of abilities and students will not use the machine as it is convenient they will use it because they can't do it in another way (Hayles, 2012). If students cannot understand the solution of the problem via one method, there are no alternative methods to make them know the situation in Artificial Intelligence applications. Due to the above-stated limitations, it is unclear yet that weather it is feasible for students to learn via technology without the presence of a teacher or not.



Figure 1: Artificial Intelligence in General.

2 WHY IS ARTIFICIAL INTELLIGENCE IMPORTANT?

Artificial Intelligence (AI) is a large-scale computer science industry that builds intelligent machines capable of accomplishing tasks that are typically human intelligence as shown in Figure 2. AI is an interdisciplinary approach, but machine education and profound learning developments cause a paradigm shift across almost every field of the software industry

(Cioffi, Travaglioni, Piscitelli, Petrillo, and De Felice, 2020).

Generally feasible from a societal point of view. Furthermore, we observe that teachers are experiencing an increased workload. AI-powered learning applications could thus not only be beneficial for students but can also increase the productivity of teachers (Tawafak et al., 2019; Armstrong, 2009).

The ability of a controlled person or intelligent person is to perform functions that usually associated with the intellectual (Clustering, 2019). Artificial Intelligence (AI) This concept is also used for the creation of structures of human mental mechanisms such as the capacity to comprehend, explore meaning, generalize, or benefit from previous experiences. Since the optical computer's invention in the 1940s, it has seen that machines can configure to conduct very complicated tasks – Proof for mathematical theorems or chess – with considerable skill – may be found (Sangalli, 2018). However, the computer processing speed and memory power are continually improving; no systems are yet accessible that can equal human dexterity across broader realms or activities involving a great deal of everyday expertise. In the other side, specific algorithms have reached the output standards of human experts and specialists in conducting such particular functions, such that in this narrow context. In areas such as medical treatment, computer search engines and recognition of language and handwriting, artificial intelligence used (Tatnall, 2019; Laura R. Winer, 2002).

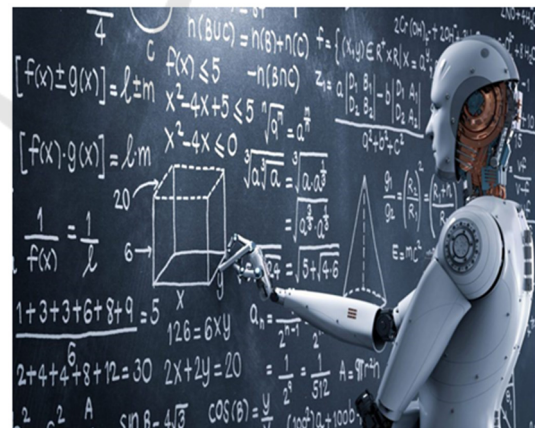


Figure 2: AI in Education Industry.

From the past few decades, the involvement of artificial intelligence in students learning process is grown speedily and the future of students' learning virtually connected with these technologies. Presently, artificial intelligence is increasing the tools for student learning every day, i.e. spell checkers, text prediction

applications, language translators, audio to text, and text to audio. Artificial Intelligence comprised of computing systems that can perform human-like tasks such as correction, learning, extracting, evaluating, and self-adapting (Tatnall, 2019; Clustering, 2019).

Artificial Intelligence is a way of making a computer, a computer-controlled robot, or a software think intelligently, in a similar manner the intelligent humans think. AI is accomplished by studying how human brain thinks, and how humans learn, decide, and work while trying to solve a problem, and then using the outcomes of this study as a basis, of developing intelligent software and systems (Thiraviyam, 2018; Geetha, and Bhanu, 2018). Figure 2 shows the impact of AI in the education sector to behave as a human style of thinking and solving problems.

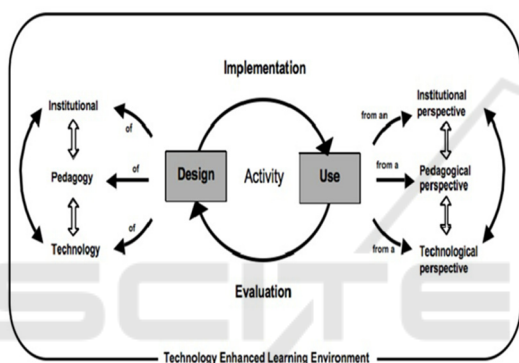


Figure 3: Environment with AI in education.

Figure 3 shows the three stages of technology enhanced learning environment phases. First phase, started with three factors as institutional, pedagogy and technology that full influenced to each other. Second phase, points to the activity of implementation and evaluation the AI impact moving from design to use process by all students and teachers. Third phase, combined among three factors to assess the institutional perspective, pedagogical perspective, and technological perspective. The purpose of writing this study, since its very outset, artificial intelligence suffered from many difficulties within growing stages in education as a system, application or service and still faced the problem in the whole world, because of not regularly reluctant to technological changes in the traditional learning or work in the organization (Aoun, 2017; Adizes, 2004). AI continuously used as a part of the organization's vision, also, is used as a promise to increase the usability and applications to include the educational sector. Furthermore, AI used to transform the educational capabilities to improve personal use.

This promise is starting to unfold as present technology has begun experimenting with different models worldwide, bringing many questions to the field of education.

3 OBJECTIVE

The main objective of this study is to give a general view of AI applications used to enhance the education domain. For example, finding a solution to complex problems required a lot of time if students try to solve them without using any tool or technology. The situation just like nowadays due to coronavirus Covid-19 where along with all aspects of everyday life educational institutions are also closed so in this case students need to learn and attend their classes via the use of technology, i.e. virtual classrooms. Therefore, advancement in technology considers the learning perspectives of students to provide them with a way to learn and conduct research fast and reliable using state of the art technologies. Universities and higher education departments are required to keep an eye on technologies and expert systems nowadays to provide and quality education with the help of the latest tool and technologies to enhance the learning outcomes of their students.

4 ARTIFICIAL INTELLIGENCE (AI)

The analyzes are focused mainly on (scientific) research about the AI context, technological possibilities. Firstly, collected as many materials as possible were collected around AI applications in education, after which the information was structured and framed (Terekhov, 2017; Alzahrani, 2011).

A long time before in 1956 a famous researcher John McCarthy defines artificial intelligence as "The machine will simulate the every learning aspect, and that will be the base of proceedings towards artificial intelligence study" (Russell, 2010). An example of usage of AI in learning is complicated algorithms set powering Apple iPhone Siri (Bostrom, 2011). After studying the different pieces of literature regarding the use of artificial intelligence in students learning. We can define this concept as artificial intelligence comprised of computing systems that can perform human-like tasks such as correction, learning, extracting, evaluating, and self-adapting.

The progression of Artificial Intelligence in students' learning is much accelerated nowadays. Most

of the higher education department is adopting this technology advancement to provide their students state of the art learning environment. Few examples of this are:

- A supercomputer Watson by IBM is providing assistance to the students of Deakin University, Australia regarding predictable and repetitive tasks of statistics, based on complex algorithms and methods (Deakin, 2014).
- Many universities are using plagiarism detection software "Turnitin" is also an example of artificial intelligence and machine learning which can help to avoid plagiarism and making students capable of working at their own hence, increasing the learning process of students (Graham-Matheson, 2013; Turner).
- A dedicated search engine provided by Google's name as "Google Scholar" is providing advanced topics and papers to students precisely as per their field of research. Hence, this Artificial Intelligence field is increasing the student's knowledge in their respective areas by exploring research articles within fraction of seconds (Noruzi, 2005; Alfarsi et al., 2020).
- Many universities are adopting the Artificial Intelligence-based program, Virtual Mentor for a quick assessment, and instant feedback about student progress and interest and providing assistance are per result to enhance the learning capabilities (Keengwe, 2012).
- Alexa, a voice assistance platform is using by Arizona State University, which is capable of answering the questions related to student's schedules. So, by this student remain to engage in study processes interestingly (Cooper, and Garner, 2012; Tawafak et al., 2018).

5 LITERATURE REVIEW

This section will discuss some selected and related studies with the topic of this study of general types of AI and its impacts on the educational sector.

AL Farsi et al., (2017) proposed an academic artificial intelligence, "A rule-based system for advising undergraduate students" it is a prototype student advising expert system. The system includes an easy user interface to use by the students it created by clips program language that used in an expert system. The system's main objective is to get an easy model with the high expert method used in artificial intelligence algorithms. The technique works through an application applied with IT BUC "Al-Buraimi University College" student (Alfarsi et al., 2019). The

system includes the information required for student registration and login successfully to the portal system of the university in Oman. Many categories and comparisons used to identify the selected course for each student based on their degree and department (Alfarsi et al., 2020).

Daptio is an organization created in 2013 as a South African solution. This organization used AI and deep analytics to provide in-depth learning, understanding, enhancement of the learning process for all students. Also, it offers personal education and specialist for both teachers and students. This service gives through the use of the internet and online connections. This study from the organization used to understand the proficiency level of each student and then match the relevant content.

The smart classroom is an Artificial Intelligence-based project which is adopted by McGill University, and the primary outcomes of this project include automatically audio capturing. Besides, video and lecture are capturing, slides and presentations capturing during live classes, and provide them access to students online (Laura R. Winer, 2002).

(Tawafak et al., 2019; Tawafak, Romli, Arshah, 2018) proposed a model called UCOM "University Communication Model", used as a type of expert service system, especially for e-learning advising learners. The main objective was to enhance student learning and their feedback on the whole e-learning process. The analysis selected the applications where the critical function and the primary purpose is to get student satisfaction on assessment services. This model used a method based on distributing surveys related to all vital factors used in education and reflected on student understanding, learning, and performance. The model shows significant positive influences among most of the relationships between elements. However, this model worked as an e-learning system more than working as an AI application. The model results worked as an application to motivate the students. At the same time, the other models used basically to apply the AI technology application.

Academic research in the field of AI is not necessarily fundamental. Practical knowledge also gained by experimenting with various applications of AI in education. We also see that schools and teachers have started to experiment with AI themselves. IT teachers who have experience with AI apply this to simplify their work. Especially teachers with a business background that have gained experience with machine learning can use these skills to education.

Another study from China, also, developed a new generation of AI applications, plans, and uses, which was produced in 2017 and going next year. This study

tries to set out the vision for China to become the new Centre in AI innovation by 2030. The study objective based on education to play a massive part in this innovation. The method starts by the advertising of Master scholarships to improve and develop the use of AI in the educational system and use, also in the daily life use as the internet of things that completely use AI to get professional work and satisfaction of service (Lu, Li, Chen, Kim, and Serikawa, 2018).

Generally speaking, AI in education can be used to transfer knowledge and skills, to assess knowledge and skills, to inform instructors of pupils' progress and achievements. (Devedžić, V., 2004) determined in his thesis that AI is not a dream; it can use efficiently to improve learner achievements based on acquiring knowledge. The AI outcomes of applications affect the next generation related to the system services and activities during the learning process as shown in Figure 4.

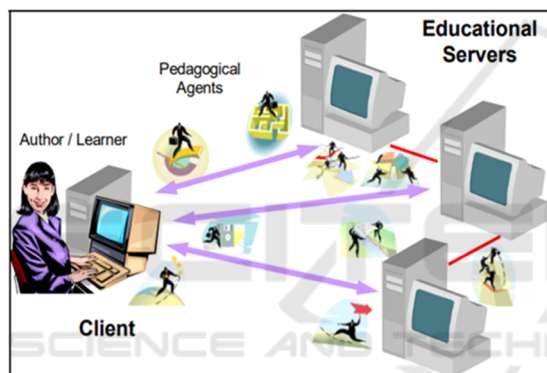


Figure 4: Setting of AI with Web-based Education.

At the end of all the above-explained studies, these models experimented with exceptional use of AI applications. For this reason, this study tries to highlight the continuous need to enhance more and more AI applications, especially in the education domain. However, most of these systems were result in positive acceptance and essential feedback from the student's side to improve their performance.

6 METHODOLOGY

This study wants to encourage the interest of developing AI applications, especially after the COVID-19 pandemic (Ahmed, Allaf, and Elghazaly, 2020; Viner et al., 2020). Where the whole world of learning strategies moved and changed to use online learning. The method used in this study is to search with keyword of articles used AI in education. Also,

the method shows the analyzed papers highlights the advantages of AI in education. The main method tries to focus on related topics with keywords like "AI in education", "AI. Application with education" and "AI Technology advantages". Most of the analyzed studies used survey to collect data and evaluate the feedback of technology acceptance and use by undergraduate students. This type of education recommended using more of artificial intelligence applications designed for every kind of specification field.

7 PROGRAM CODE

The following segment program shows the programming code of activating student learning outcomes through an active assessment model.

```
<div id="test1" class="col s12"
style="display: none;">
<span id="sending" class="red-
text"></span>
<table class="highlight" id="courses
table">
<thead>
<tr><th>Course</th>
<th>Date</th><th>Action</th>
</tr> </thead> <tbody>
<a class="btn red" id="load more">Load
more items [ if exist] </a>
<div class="fixed-action-btn
horizontal">
<a class="btn-floating btn-large
waves-effect waves-light red modal-
trigger" href="#modal1">
<i class="material-icons">add</i>
</div>
<div id="modal1" class="modal bottom-
sheet modal-fixed-footer" style="z-
index: 1003;">
<form id="add form"><div class="modal-
content">
<div class="row container"><div
class="col s12"><div class="row"><div
class="input-field col s12">
<input
class="validate" id="course title"
type="text">
End.|
```

Figure 5: Programming code of activating student learning outcomes.

8 DISCUSSIONS

AI applications generally implement sophisticated statistical models. Moreover, a forecast is almost ever 100 per cent correct (which would not, of course, mean a human being should perform better). Sometimes there is a trade-off between model precision and model interpretability. It is harder to understand, but much more efficient, more complex AI-algorithms, especially the recently available profound learning algorithms because the need for interpretative models

is growing because of the increasing use of machine learning to simplify human functionalities. Questions what is a suitable model in, what is a flawed model in, and how does a prediction come? If a model used in practice, the reply should give.

Game-based helped develop ways of testing complex models of machine learning. It illustrates the features of the configuration in an option and how also with the most complex ones. Throughout the field of evolutionary neural networks, substantial progress has made to provide an insight into these models. The function visualization can make clear when individual layers of a neural network are triggered (Olay et al., 2017). The studies show that the earlier layers of the system contain basic geometric shapes, including corners and edges. We see more complex combinations of these geometric patterns as we examine the network further. To create more complex features, each layer of the system combines the designs from the previous layers. Such observations can use to assess what the network pays attention to while making a forecast.

9 CONCLUSION

In the end, this study tried to produce a general view of artificial intelligence use in the education domain. The study attempts to highlight some of the advantages and disadvantages of keep using AI applications. Besides, the course illustrates the literature review of many tasks related to the education sector. The method of the works used the search for similar studies related to AI usage in education sector and its advantages of use. The discussion shows an improvement of student's acceptance, and it motivates them to increase their use of AI in their continuous learning process. However, with the new world case of triable coronavirus (COVID-19) pandemic spreading out, life needs more and more deep use of AI. The education domain was one of these sectors affected by this situation. The recommendation of this study is to keep the increase of using AI for the benefits of technology development, student's confidence, enhancing academic performance, etc.

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