

Role of Artificial Intelligence in Teaching and Learning at University Level in Pakistan: Challenges and Implications

Abstract

Artificial Intelligence (AI) is a growing technological field capable of changing teaching and learning and every aspect of our social interaction. Artificial Intelligence (AI) has stimulated every field of life. Teaching and learning have no exception. Artificial Intelligence (AI) has changed teaching and learning. Artificial Intelligence (AI) is intelligence shown by machines and software which work like human intelligence effectively and accurately for long hour. Artificial intelligence is being used in every walk of our daily life and human deeds. Artificial intelligence has improved the performance of industry, service, security, medical, weather forecasting, engineering, business, teaching and learning at every level. How this innovative technology has affected teaching and learning at university level in Pakistan. The objectives of the research study were to examine the role of Artificial Intelligence (AI) in teaching and learning at university level in Pakistan, to explore the challenges for Artificial Intelligence (AI) in teaching and learning at university level in Pakistan, to find the implications Artificial Intelligence (AI) in teaching and learning at university level in Pakistan. Methodology of the study was as, Mixed method design was used. Population of the study were all faculty members of all public and private sectors universities. Through simple random sampling technique sample of the study was four Head of the Departments (HODs), four faculty members from all public and private sectors universities of all public and private sectors universities in Rawalpindi and Islamabad. Role of artificial intelligence was evaluated through self-developed Questionnaire. Data analysis techniques for this study were used t-Test, mean score and percentage. Findings of the study were Majority of the head of the departments and faculty members were aware about the concept of Artificial Intelligence (AI) in public and private sector universities. Only few faculty members were using Artificial Intelligence (AI) in their teaching and learning process. It was difficult for faculty members to use Artificial Intelligence (AI) in their teaching and learning process because of less knowledge. Majority of the head of the departments and faculty members

did not know AI applications. Only few universities were using Artificial Intelligence (AI) in their teaching and learning process. Recommendations were faculty members be given training about Artificial intelligence. HEC should encourage about use of Artificial Intelligence in teaching and learning at university level in Pakistan. Special courses/workshops be conducted for Artificial intelligence in teaching and learning at university level in Pakistan. HEC should start special drive for the use of artificial intelligence in the public and private sector universities in Pakistan. University stakeholders should encourage the faculty members and students for the use of artificial intelligence in teaching and learning.

Keywords: *Artificial Intelligence (AI), teaching and learning, Education, Use, technology*

Introduction

Artificial Intelligence (AI) is combination of two words. The intelligence shown by machines rather than human minds is called Artificial Intelligence (AI). Intelligence demonstrated, shown by human and other animals has emotions and consciousness while Artificial Intelligence (AI) has no such features and characteristics. This term Artificial Intelligence (AI) was first used by John McCarthy in year 1955. He defined it “making a machine behave in ways that would be called intelligence if a human were so behaving” Alan Turing in 1950 interpreted “ Computing machines may think like humans bring think someday”. He assumed “Programmed machine will make such calculations that human minds would not do rationally”. Computing machines are working on binary digits system and essential question is how binary calculations will hold human beings.

Artificial Intelligence (AI) is altering every walk of life and society. Teaching and learning has no exception. Technology has forced many countries to implement the use of Artificial Intelligence in educational sector. Many countries are getting

benefits from the use of Artificial Intelligence (AI). In education sector especially in teaching and learning. Upcoming time of education, teaching and learning is attached with Artificial Intelligence. (Popenici & Kerr, 2017).

1. Statement of the research problem

Pakistani universities are not working according to international standard. Pakistani universities need adaptation, application of innovative technologies to improve their poor condition. That is why researcher wanted to “explore the role of artificial intelligence in teaching and learning at university level in Pakistan: challenges and implications”

2. Objectives of the study

1. To examine the role of Artificial Intelligence (AI) in teaching and learning at university level in Pakistan
2. To find the implications Artificial Intelligence (AI) in teaching and learning at university level in Pakistan

3. Research Questions

1. What are the practices of Artificial intelligence (AI) in teaching and learning at university in Pakistan
2. What are uses of Artificial Intelligence (AI) in teaching and learning at university level in Pakistan
3. What are the challenges for AI in teaching and learning at university level in Pakistan
4. What are the implications Artificial intelligence (AI) in teaching and learning at university level in Pakistan.

4. Limitation of the study

Each research study has some weaknesses and limitation. It is courageous to state the weak points and limitations of your research study. No one can claim that his study has no weaknesses. There are a limitations of this research study. Limitations were found in this research study. The busy and tough schedule in universities made it difficult for me to distribute and collect the research questionnaire.

5. Delimitation of the study

Islamabad is the capital of Pakistan. It represents all parts of the country. Due to time and financial constraints the study was delimited to

1. All public sector universities in Islamabad, Rawalpindi
2. All private sector universities in Islamabad, Rawalpindi
3. Four faculty members of each public and private university in Rawalpindi and Islamabad

Literature review

The use of Artificial Intelligence (AI) in our day to day lives has been on the rise. AI is now present in our smart phones, websites, personal gadgets, etc. From undertaking complex tasks in the past to now carrying out even the simplest of exercises, we can see that AI is here to stay. One of the domains that has a promising future is the use of AI in teaching and learning where it has the potential to be applied as a solution to some of education's major issues present (Pedro et al., 2019).

Role of Artificial Intelligence (AI) in Teaching and learning

Artificial Intelligence (AI) initially appeared in teaching and learning in 1950 when U.S Department of Defense want teaching and learning to create a system that could take decisions and make plans about crucial issues. Currently Artificial Intelligence (AI) has spread its arms all over the world.

1. Artificial Intelligence as new electricity

Artificial intelligence is revolutionary instrument in society, knowledge economy. Artificial intelligence is named as new electricity by many expert. Artificial Intelligence can solve many problem in daily life routine. It is true that it can replace human in daily work routine. It plays an

innovative role in teaching and learning. Artificial Intelligence is deeply helpful for teaching and learning at every level of education. Artificial Intelligence presents the modern solutions to teaching and learning, medical diagnosis, automatic solutions to many issues in teaching and learning at university level. How this “new electricity” work, main question does is this. In artificial intelligence everything is based on algorithms. Artificial intelligence is based on logical statements that lead to best decisions and solutions of problems. Artificial intelligence is divided into two major type such as weak artificial intelligence and strong artificial intelligence. (Ahmad, M.F& Ghapar, W.R.G.W.A, 2019)

2. General ways of AI implementation

Artificial Intelligence (AI) be involved in educational processes i.e. teaching and learning? Artificial Intelligence can be applied in teaching and learning in many ways such as the following.

1 Tutoring system: In artificial intelligence there are many processes and procedures to teach students. There are installed algorithms that reply quickly to the queries of the students. These algorithms offer feedback to the students' questions rapidly that is a valuable support to all of students in learning processes. Tutoring is easy and swift by using Artificial Intelligence (AI) in teaching and learning process. (Mitrovic, et al 2009).

2. Personalize learning of students: Personalize learning of students is very helpful and supportive of students and teachers. Personalize learning of students is stimulating and attention- grapping of learners and teachers both. This help the instructor in teaching process significantly. Already fixed algorithms can diagnose the problems and issues of individual student and then regulate the standardize the levels of students for best comprehension and understanding of the knowledge at every stage.

3. Detection of dyslexia: A company of Sweden namely LEXPLORE has established a system which identifies dyslexia by movements of eye.

4. Finding and identification of ADHD: Artificial intelligence (AI) algorithms can detect, identify about children types, if a adolescent is autistic or perhaps has attention, shortage and deficit hyperactivity sickness(ADHD). This is very help for

teacher about their students's personal information in their profile. This provide a guideline to the instructors in teaching process.

5. Tasks and jobs: Artificial intelligence (AI) can do daily routine jobs in teaching and learning. Artificial intelligence (AI) help in the grading of students' assignments, develop new questions in the teaching learning system. Algorithms of AI can call students' attendance that help for teachers and save their precious time.

6. New Methods and techniques such as MOOCs: Many universities offer MOOCs. MOOC stand Massive Open Online Courses. Many universities offer quality teaching and learning. MOOC is innovative and modern way teaching in universities. There are universities which offer new teaching and learning techniques. Some example of these are Coursera, Udemx, Third Space learning, Greek Brainy. These platform apply Artificial Intelligence (AI) tools, skills for grading and personalize learning, These platforms practice Artificial intelligence (AI) technologies and innovative ideas for the support and benefit of their students.

7. Enhanced Learning and Teaching: Artificial Intelligence help and enhance teaching and learning in universities of both sectors

8. Personalized Education: AI can provide personalized learning experiences by adapting educational materials to the needs of individual students, catering to their learning styles and pace.

9 Intelligent Tutoring Systems: AI-powered tutoring systems can offer additional support to students, helping them with difficult subjects and providing instant feedback.

3.1 The influence of AI on learning

Artificial Intelligence (AI) influence deeply teaching and learning. Artificial Intelligence (AI) puts both positive and negative effects on teaching and learning, but positive effects are more than negative. Artificial Intelligence (AI) facilitates teaching and learning both for faculty members and students, learners.

6.ChatGPT

It is a computer program that is design teaching and learning to understand and respond to human language in a natural and human-like way. Think of it like a virtual assistant or a Chabot that can understand and respond to written or spoken language. It's been train teaching and learning on a large dataset of text from the internet and it can be used for teaching and learning for a variety of tasks such as answering questions, translating languages, and even writing creative text. For example, it could be used teaching and learning in teaching and learning to create an intelligent tutoring system that can understand and respond to student inquiries, or in customer service to help people with their questions.” Personalize teaching and learning Approach to Teaching and learning. One of the most promising applications of AI in teaching and learning is personalize teaching and learning. Personalize teaching and learning is an approach to teaching and learning that tailors learning experiences to the individual of each student. This approach can significantly improve teaching and learning al outcomes by ensuring that each student receives content and experiences best suit teaching and learning to their needs .AI can be used teaching and learning to personalize learning in several way.

Research Methodology

1.1 Introduction

This section presents a plan, research design and methodologies. The aim of this section is to outline the practical and theoretical methodologies used in performing the research. This section discusses the research design, research techniques used in the study, which include the design of the research study, population, sample, sampling techniques and instrumentation.

(Creswell,2009). Research Design:

Mixed method design was used. For this study t-Test, mean score and percentage was applied.

Population

All heads of the departments of all public and private sectors universities in Pakistan. All faculty members from all public and private sector universities in Pakistan.

Islamabad		Rawalpindi		Total
Public	Private	Public	Private	
17	8	8	2	35

Sample

Due to the constraints of time and financial problems the research study was delimited to all public and private sector universities in Rawalpindi and Islamabad. four faculty members from all public and private sectors universities in Rawalpindi and Islamabad were in sample of the study. 100 faculty members from public sector universities in Rawalpindi and Islamabad and 40 faculty members from private sector universities Rawalpindi and Islamabad. Total sample was 140 faculty members from public and private sector universities Rawalpindi and Islamabad.

Sample of Universities

Islamabad		Rawalpindi		Total
Public	Private	Public	Private	
17	8	8	2	35

Sample of the faculty members of public and private sector universities

Islamabad		Rawalpindi		Total
Public	Private	Public	Private	
17*4=68	8*4=32	8*4=32	2*4=8	35*4=140

Sampling technique Simple random sampling technique was used for data collection. Four head of the department and four faculty members were chosen through simple random sampling technique from the sample of universities.

Instrumentation: Research instrument are equipment used to gather data for research study (Cressell,2009). A self- developed questionnaire was used to collect data from respondents.

Data collection: faculty members and HODs were investigated through questionnaire. Researcher applied the concurrent triangulation design as method for gathering and analyzing both qualitative and quantitative data during the research. Qualitative and quantitative were collected and analyzed at the same time.

Data analysis: The analysis of data is crucial to the success of any research study. Data analysis is still one of the most challenging aspects of research. Data analysis in mixed-methods research. According to Creswell and Plano (2007), consists of examining quantitative data using quantitative methods and qualitative data using qualitative methods

Data Analysis and Interpretations

The aim of this study was to examine the role of Artificial intelligence in teaching and learning at university level in Pakistan. The responses of the respondents were tabulated, interpreted, and analyzed. Mixed method design was used to analyze the gathered data. For this study t-Test, mean score and percentage was used for data analysis. Qualitative data was analyzed by thematic analysis, document analysis. The following tables show the results of what the respondents replied.

Table 1

Familiarity with the concept of Artificial Intelligence (AI) in universities

Responses	Public	%	Mean	Private	%	Mean	t-test
SA	70	70	2.4	10	25	2.1	2.34
A	6	6		4	10		
U	14	14		2	5		
DA	3	3		21	52		
SDA	7	7		3	8		
Total	100	100		40	100		

Significant df= 4

Value of t-Test at 0.05= 2.13

Table 2

Using Artificial Intelligence (AI) for teaching and learning

Responses	Public	%	Mean	Private	%	Mean	t-Test
SA	62	62	2.5	10	25.	2.6	2.37
A	8	12		8	20		
U	18	26		5	12		
DA	2	3		16	40		
SDA	10	10		1	3		
Total	100	100		40	100		

Significant df= 4

Value of t-Test at 0.05= 2.13

Table 3: *Latest knowledge about using AI in teaching and learning at university level*

Responses	Public	%	Mean	Private	%	Mean	t-Test
SA	13	13	2.4	2	5	2.3	2.39
A	9	9		10	25		
U	1	1		2	5		
DA	6	6		0	0		
SDA	71	71		26	65		
Total	100	100		40	100		

Significant df= 4

Value of t-Test at 0.05= 2.13

Table 4: *Beneficial for you to use AI applications for teaching and learning in universities*

Responses	Public	%	Mean	Private	%	Mean	t-Test
SA	42	42	2.45	20	50	2.34	2.42s
A	17	17		12	30		
U	1	1		0	0		
DA	37	37		0	0		
SDA	3	3		8	20		

Total	100	100		40	100		
Significant df= 4				Value of t-Test at 0.05= 2.13			

Findings

1. Majority of the head of the departments and faculty members were aware about the concept of Artificial Intelligence (AI) in public and private sector universities.
2. Only few faculty members were using Artificial Intelligence (AI) in their teaching and learning process.
3. It was difficult for faculty members to use Artificial Intelligence (AI) in their teaching and learning process because of less knowledge.
4. Majority of the head of the departments and faculty members did not know AI applications.
5. Only few universities were using Artificial Intelligence (AI) in their teaching and learning process.
6. Majority of respondents told that they have never participated in any workshop about Artificial Intelligence (AI) during their entire service.
7. All were agreed that AI was useful for teaching and learning process.
8. Stakeholders encouraged to use AI in teaching and learning process at university level in Pakistan.
9. Majority of faculty members were interested to participate in AI course/ degree or certificate.

10. Majority of faculty members feel to participate in Artificial Intelligence (AI) refresher course for improvement?
11. Majority of the faculty members responded that data powered by AI enhance teaching and learning and support students.
12. Majority of the faculty members responded that they require AI training and workshops
13. AI-driven programs give students and teachers new solutions for teaching and learning
14. Data powered by AI enhance teaching, learning and support students
14. Students receive helpful feedback by use of Artificial Intelligence (AI) in teaching and learning at university level in Pakistan.

Discussion

The research study was mainly related to the "role of artificial intelligence in teaching and learning at university level in Pakistan" According to the findings of the research study public sector universities faculty members were better aware about the concept of artificial intelligence. As a whole public sector universities were better than private sector universities for the use of artificial intelligence in teaching and learning and learning at university level in Pakistan. In some areas of artificial intelligence AI private sector universities were working and performing better than public sector universities.

Challenges and Concerns of AI in Teaching and learning

Despite the great potential offered by AI-supported learning, AI's extensive use in science education may not guarantee teachers' ability to employ it in the classroom, and neither does it guarantee the quality of teaching because teachers may not yet be fully prepared to implement AI-based teaching (United Nations Educational, Scientific and Cultural Organization, 2019). Moreover, the effective adoption of new educational techniques is closely linked to the attitudes of science teachers towards them. There is still a group of teachers who view the application of technology in the classroom negatively and do not tend to use it but rather continue to use traditional teaching materials and methodologies. Concern about the use of new techniques may hamper teachers' efforts to apply technology in their work (H'ebert et al., 2021).

Conclusions

In order to realize the full potential of AI in teaching and learning, we need to invest in research and development and create partnerships between educators, researchers, and developers. We also need to create an environment where AI can thrive by ensuring that data is accessible and ethical and that we have the infrastructure to support AI applications. Only by working together can we create the future of teaching and learning that we all want to see. If they are interested in teaching and learning in exploring the potential of AI in teaching and learning, there are many ways they can get involved in teaching and learning. They can support research and development projects, work with educators to implement AI applications in the classroom or learn more about the topic. Whatever they do,

remember that the potential of AI to transform teaching and learning is vast, and we need to work together to realize its full potential. While AI has the potential to revolutionize the way we think about teaching and learning, there are still many challenges and concerns that teaching and learning to be address teaching and learning. It is important for researchers and developers to continue to explore the potential of AI in teaching and learning and to work towards addressing the challenges and concerns that may appear as this kind of technology keeps improving and being implement teaching and learning in the current teaching and learning system.

Recommendations

1. Faculty members be given training about Artificial intelligence
2. HEC should encourage about use of Artificial Intelligence in teaching and learning at university level in Pakistan.
3. Special courses/workshops be conducted for Artificial intelligence in teaching and learning at university level in Pakistan
4. HEC should start special drive for the use of artificial intelligence in the public and private sector universities in Pakistan.
5. University stakeholders should encourage the faculty members and students for the use of artificial intelligence in teaching and learning

- **Implementing these recommendations can help universities in Pakistan effectively harness the power of AI to enhance teaching and learning.** By addressing infrastructure, training, ethics, and collaboration, universities

can create a robust framework for integrating AI and driving educational innovation. Here are some recommendations:

- **Develop a Strategic Plan:**
- **Formulate a Vision:** Develop a clear vision and strategy for the integration of AI in education. This should align with the university's goals and address specific needs and challenges.
- **Set Objectives:** Establish specific, measurable objectives for AI implementation, such as improving student engagement, enhancing personalized learning, or streamlining administrative tasks.
- **Invest in Infrastructure and Resources.** By investing in infrastructure and resources, we can improve the situation and position of our public and private sector universities. If we develop the infrastructure and our resources then use and implementation of artificial intelligence will become easier.

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