

Assessment of Artificial Intelligence virtual Learning Applications & Conventional Classroom Learning Methods

Archana Yadav
Assistant Professor, College of Vocational Studies,
(University of Delhi),
India.

Abstract

This article provides a comparative study between Classroom Learning and learning acquired by means of Artificial Intelligence virtual Learning tools in Higher Education. The study was conducted on students of Delhi University, India in higher education pursuing degree program in the age group of 18-25. The study concluded that students proffer AI Learning tools to be additional learning aid to classroom learning. There are certain aspects to classroom learning which are preferred by students over AI tools such as Interactions in the classroom, Role of Teachers as motivators and mentors. Students perceive AI tools method of learning to be useful in providing convenience and flexibility in the process of learning. They are useful in saving time. AI learning Virtual tools are perceived as a supplement by Higher education students in India to the current classroom learning.

(Key words: Artificial Intelligence Virtual Tools, Classroom Learning, Higher Education)

(I) Introduction

Artificial Intelligence in Education

Artificial Intelligence is based on the concept that human cognitive practices can be imitated by machines and be automated. Use of AI applications in formal education is in the introductory stage, students are using them in addition to classroom learning in India. Even though they are used by students in Higher education however dependence still lies primarily with teachers. AI in education is expected to grow significantly growth about at the rate of 43% in coming years according to horizon report 2018. AI being in the introductory stage in Education needs more clarity and various challenges to be addressed. (Educause, 2018), with a time to adoption of 2 or 3 years. According to the report, experts anticipate AI in education to grow by 43% in the period 2018–2022.

1.1 History of AI

380 BC and the late 1600s: mathematicians, theologians, philosophers, professors, and authors worked on the idea of calculating machines, that eventually led to the concept of mechanized “human” thought in non-human beings.

1700s Jonathan Swift’s novel “Gulliver’s Travels” mentioned a device called *the engine*, which is one of the earliest references to a computer. The device intended purpose was to improve mechanical operations, with the help of a non-human mind.

1921: Karel Čapek, a Czech playwright, first time used the word robot through his science fiction play “Rossum’s Universal Robots”. His play brought forth the concept of factory-made artificial people who he called robots.

1929: Japanese biologist and professor Makoto Nishimura created Gakutensoku, the first robot Gakutensoku translates to “learning from the laws of nature,” mused the robot’s artificially intelligent mind could extract knowledge from people and nature including moving its head and hands as well as changing its facial expressions.

1935: Alan Mathison Turing British Computer Pioneer, described computing machine having limitless memory and a scanner moving back and forth by memory by symbols. This concept is now known as Turing Machine.

1945 Donald Michie Turing's colleague at Bletchley Park found Department of Machine Intelligence and perception at the University of Edinburgh. He also recalled Turing's frequent discussions as to how computers can learn from experience and contribute in problem solving through use of guiding, principles – known as heuristic problem solving.

1951 Christopher Strachey quoted first AI program, later Strachey's director at university of oxford ran program on Ferranti Mark computer at University of Manchester England.

1952 Arthur Samuel developed a game checkers who took over Strachey's checker program and extended it over the time. In 1955, he enabled the program to learn from experience, Samuel came up with mechanisms for role learning and generalization, his program won game against a checker champion in 1962. Shopper was instructed to purchase out of eight shops simulated. Shopper while purchase would memorize items in each shopping next time when shopper was instructed to shop it would go straight to the right shop. Samuel's programs continued in evolutionary computing. Evolutionary computing involves automatic methods of generating and evaluating, till highly proficient solution comes.

1956-57 Allen Newell and J. Clifford Shaw of the RAND corporation and Herbert Simon of Carnegie Melon university contributed landmark by theorem program. The program was known as the Logic Theorist. They also wrote program called the General Problem Solver or GPS the first version ran in 1957. GPS would solve multiple number of problems/puzzles using trial and error approach Newell, Simon and Shaw developed Information Processing Language (IPL) a computer language which tailored for AI programming.

1959 John Holland proposed a multiprocessor computer that would assign artificial neuron also contributed to evolutionary computing by uniting test for prototype of IBM 701 computer. He designed a neural network experimenting with a virtual rat that could be trained to reach his maze.

1960 John McCarthy coined the term AI Combined IPL elements and produced LISP (List processor a programming language)

1966: Charles Rosen developed 'Shakey' the Robot, with the help of 11 others. Shakey was the first general-purpose mobile robot, also known as the "first electronic person."

1966 Joseph Weizenbaum of MIT AI Laboratory wrote AI Program called 'Eliza' & Kenneth Golby a Psychiatrist of Stanford university wrote 'Parry' developed language programs where psychiatrists were asked if they were in communication with Parry or human were not able to identity. Eliza also was canned on sentences and programming tricks.

1968-72 Bertram Raphael at Stanford Research Institute came up with another micro word approach 'Shakey' a mobile robot 1972 Terry win grad of MIT introduced 'SHRDLU'; SHRDLU responded to commands typed in English

1970s Marvin Minsky & Seymour Papert of MIT AI Laboratory proposed programs related to intelligent behavior known as micro words.

1973 Alain Colmerauer –at the university of Air-Marseille, France conceived logic programming language. PROLOG can determine whether given statement is logical from other given statements. PROLOG is used widely in Europe and Japan. These languages are based on tense logic which allows statements to be located in the flow of time (Philosopher Arthur Prior at the University of Canterbury, Christchurch, New Zealand invented the 'Tense logic'.

1985 Daniel Mills built the 65,6536 processor Thinking Machines corporation 'super computer'.

1991 Hugh Loebner an American philanthropist began annual Loebner prize competition awarding \$ 100,000 to pass Turing's test to first computer and \$2000 each to best effort.

1995: Richard Wallace Computer scientist developed the chatbot A.L.I.C.E (Artificial Linguistic Internet Computer Entity), inspired by Weizenbaum's ELIZA. What differentiated A.L.I.C.E. from ELIZA was the addition of natural language sample data collection.

1997: Deep Blue, a chess-playing computer developed by IBM became the first system to win a chess game against a reigning world champion.

1998: Dave Hampton and Caleb Chung invented Furby, the first “pet” toy robot for children.

1999: Sony introduced AIBO (Artificial Intelligence RoBOt), a robotic pet dog designed to “learn” by interacting with its environment.

2000: Cynthia Breazeal developed Kismet, a robot designed like human face which could recognize and simulate emotions. Honda releases ASIMO, an artificially intelligent humanoid 2002: i-Robot introduced Roomba, an autonomous robot vacuum .

2009: Google developed a driverless car, it passed Nevada’s self-driving test.

2010: Microsoft launched ‘Kinect’ the first gaming device that tracked human body movement using a 3D camera and infrared detection.

2011: IBM created ‘Watson’, a natural language question answering computer

2011: Apple released ‘Siri’, a virtual assistant which uses a natural-language user to infer, observe, answer, and recommend things to its human user. It can adapt to voice commands and provide customized experience to users.

2016: Hanson Robotics created A human image robot named Sophia . She is known as the first “robot citizen.” She has the ability to recognize image, make facial expressions, and communicate through AI which makes her more popular compared to earlier humanoid robots

2016: Google released Google Home, a ‘personal assistant’ that uses AI to act as to help users remember tasks, create appointments, and search for information by voice.

2017: The Facebook Artificial Intelligence Research lab created Chat bot to communicate.

2018: Alibaba language processing AI outscored human intellect at a Stanford reading and comprehension. created by Chinese Tech group.

2018: Google developed BERT, that can be used on a variety of natural language tasks.

2018: Samsung introduced Bixby, a virtual assistant. Bixby has functions of voice, vision, it can answer user’s questions and provide suggestions.

(II) Review of Literature

Hinojo-Lucena, Aznar-Díaz, Cáceres-Reche, & Romero-Rodríguez (2019) perceive that AI based tools are already introduced in higher education . (Salmon,2000). Suggest that AIED can contribute to collaborative learning by based on online learning models, by on line group inter-action and discussions that can be used by a human tutor for better understanding and clarity in defining the aim, and goal of the learning .similar view was described byBonk (2017) who found that online learning can streamline the learning process, as it helps students in learning more quickly and by means of flexibility. Onah et al39. (2014) view that the online learning allows learners to participate in the learning process as per their own convenience in their own preferred way, (Source footnote) Bonk (2017) However Means’ (2009) Mean’s study found no significant improvement in learning outcomes for online courses compared to classroom-based learning. Chaudhri, et al., (2013) suggests that ITS systems perform as good as human tutors if not better for many students.

Luckin, Holmes, Griffiths, and Forcier (2016) proffer three categories of AI applications in education a) personal tutors, b) intelligent support for collaborative learning, and c) intelligent virtual reality. Jonassen, Davidson, Collins, Campbell, & Haag (1995) learning is a social exercise; interaction and collaboration are at the heart of the learning process. Russel and Norvig (2010) raise concern about ethical aspect involved in their leading textbook on artificial intelligence, “All AI researchers should be concerned with the ethical

implications of their work” (p. 1020). Baker & Smith,2019, p. 10). Question still remains whether machines will be able to actually think and develop consciousness in the future, or rather just project rational behavior. Justin Klutka, Nathan Ackerly, and Andrew J. Magda, (2018) describe AI will have a positive influence on higher education, improving outcomes and helping institutions scale quality education for their students. At the same time there would be practical challenges to be addressed such as ethical challenges .

(III) Research Methodology

The study was conducted was by contacting Students pursuing Graduation in Delhi University in the age group of 18-25. They were interviewed, Group discussions were held and were asked to fill up the questionnaires which were provided to them by Google-docs. 144 online questionnaires were sent out of which 77responded. Time taken to complete the entire process was about three months conducted in few rounds. In the first round the students were provided the introductory session including basic knowledge about Artificial Intelligence Tools ,their usage in educational learning ,as it seemed that some of the students were not aware yet they were using the digital tools of AI in their learning hence not only they were provided with introductory session about AI tools but also their questions and doubts were addressed .which was followed by Questionnaire filling, group discussions in the subsequent rounds. follow ups were conducted by forming groups of students on the basis of similarity for instance students pursuing common program in University, common location, common friend circle on wats App so that larger number of students could be contacted at the same time via WhatsApp groups and E-mails.

3.1 Measures

Questionnaires were sent by E-mail, on mobile WhatsApp groups, which included close ended as well as open ended questions including the background of the student.

Have you used Artificial Intelligence Educational virtual Tools ?
How Frequently do you use AI Learning Educational virtual Tools ?
Which AI virtual Tools did you use?
Rate your Level of satisfaction .
Which part of learning in specific was most useful ? from the mentioned below .
(a) Concept Clarity
(b) Convenience
(c) flexibility
(d)Time Saving
(e) Economical
Are AI Educational tools supplement or Replacement to Classroom learning ?
Mention Specific experience which was better in AI Virtual Tools compared to Classroom /Conventional learning methods.
What problems are faced by students in Classroom learning which were overcome by AI Tools ?
What Aspects of classroom learning are better compared to AI learning Tools ?
What Aspects of Classroom learning cannot be replaced by AI virtual Tools?
Would you like to replace AI virtual Learning tools to Classroom Teaching?
What are those roles of a Teacher that cannot be performed by AI?

Table 3.1. survey ,2019

(IV) Results and Discussions

4.1 Have you used Artificial Intelligence Virtual Tools for Learning ?

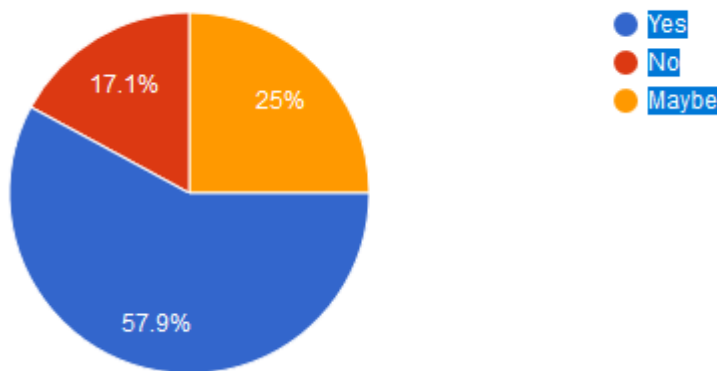


Fig.4.1. Number of students using AI virtual Apps, survey,2020

57.9 % students used AI applications in addition to Classroom education. while 25% were not sure and 17.1 % did not use at all which indicates around 60% students use AI virtual Tools.

4.2 How Frequently do you use AI Learning Virtual tools ?

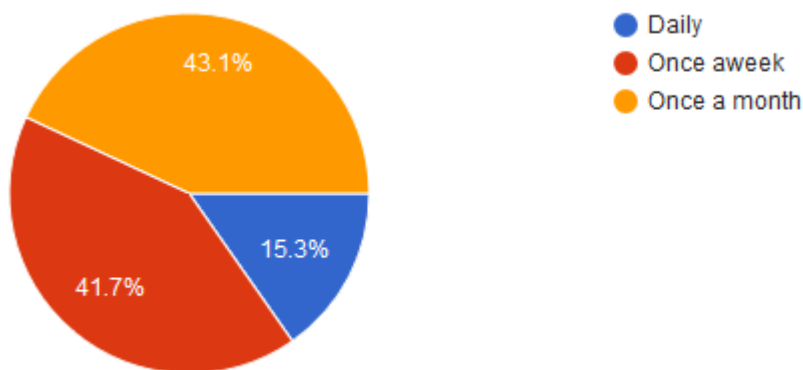


fig.4.2. Usage frequency of virtual AI Apps, survey,2020

Frequency of using AI Learning virtual tools was limited to being highest amongst students Graduate students of Delhi University ,India between age of 18-25 who used them once a month followed by once a week and being minimum who used on daily basis. 43.1% students use once a month and 41.7% use it on weekly basis, only 15.3 % students indicted its use on daily basis.

4.3 Which AI Learning virtual Apps did you use?

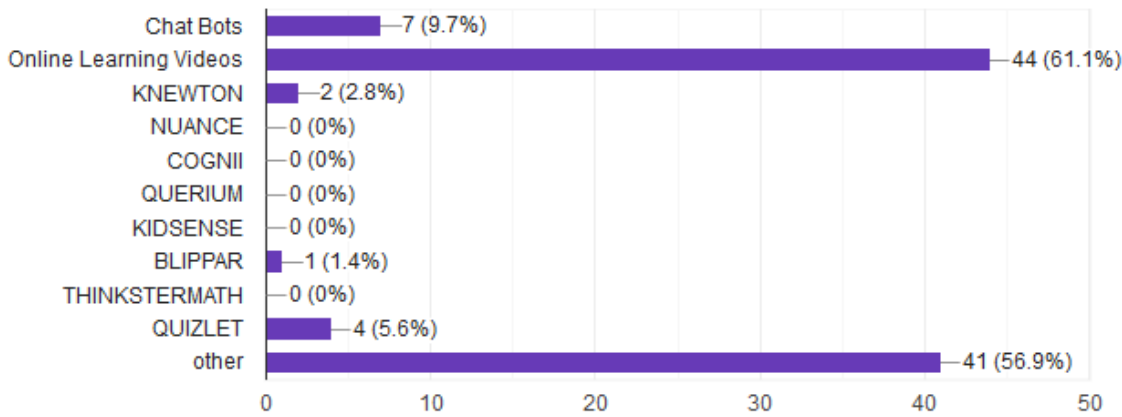


fig 4.3. virtual learning apps, survey,2020

Online videos seemed to be more popularly of 61.1% for learning purpose, 9.7% used chat bots ,56.9% used other AI Tools not mentioned in the list.

4.4. Rate your Level of satisfaction

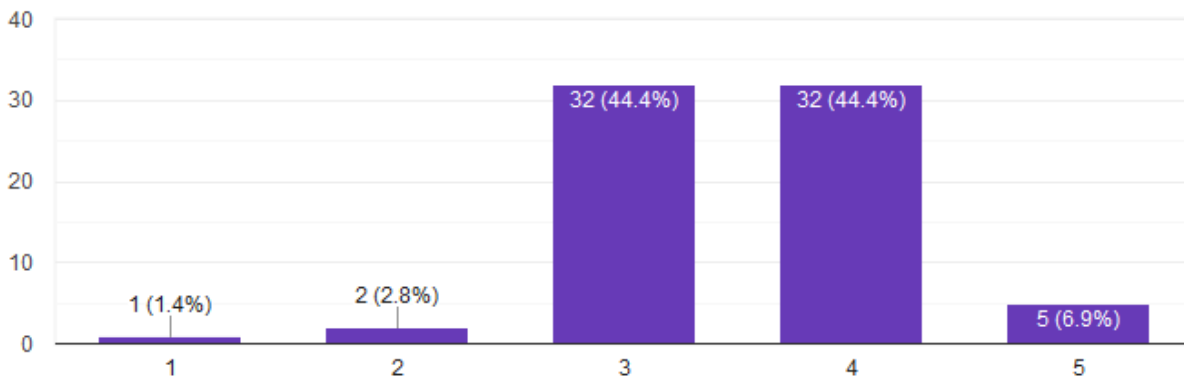


fig.4.4. Level of satisfaction, survey ,2020

4.5 What specific part of learning was most helpful?

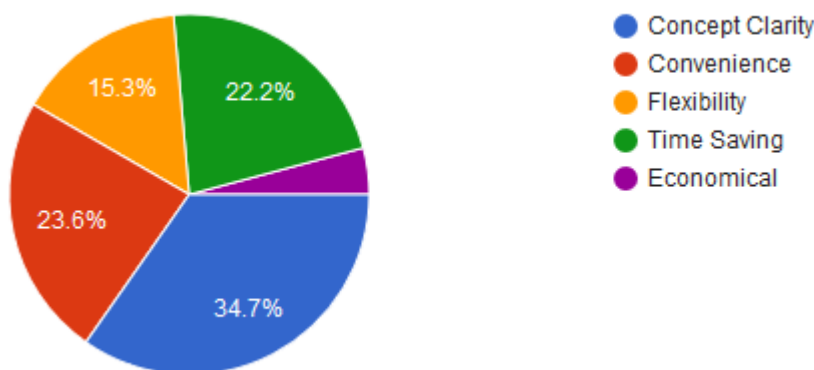


fig.4.5. Specific relevance of virtual AI Apps , survey,2020

Responses indicated that the top reason for students for using AI Learning Apps was concept clarity, closely followed by Convenience and Time Saving, Flexibility also mattered to them.

1. Concept Clarity -34.7 % students perceived AI Applications useful in learning for concept clarity
2. Convenience –23.6% considered Convenience was a major factor for using AI tools.
3. Time Saving - 22.2% rated Time saving as important criteria for choosing AI applications as a medium of learning.
4. Flexibility -15.3% considered flexibility offered by AI applications to be important factor.

Economical – only 4.2 % considered it economical which was not very significant in number

In further discussions it was noticed that Convenience, Flexibility of Time and Accessibility, saving of Time, were the major and most significant factors considered by students while choosing AI Applications. Repetition of a concept already taught in class and further clearing doubts was also useful.

risk of embarrassment is avoided, some students fear embarrassment in the classroom in front of their peers as some of them are shy and due to various reasons hesitant and uncomfortable to ask questions. Problem of inability of Personalization giving attention to all students is overcome

4.6. What is total Contribution in Learning a Particular concept in Percentage out of 100 by AI virtual tools?

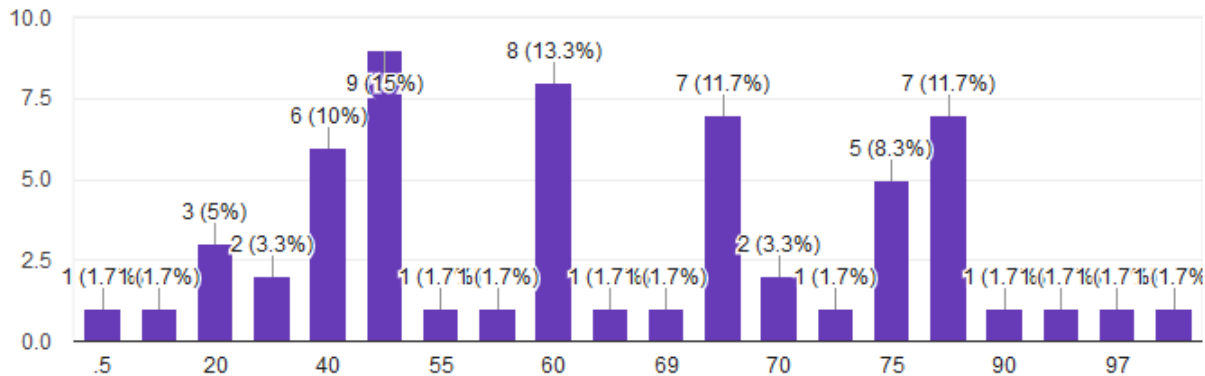


fig.4.6. contribution of AI Virtual apps in the learning, survey,2020

4.7. Would you like to Replace AI Learning tools to Classroom Teaching?

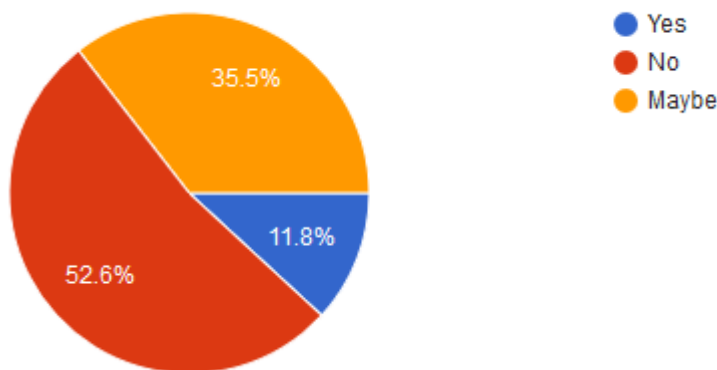


fig.4.7.AI Virtual learning Replacement to classroom method, survey,2020

52.6 % students answered in ‘No’ whether they wanted to replace AI tools of learning to classroom Learning, only 11.8% students answered in ‘Yes’ that they were of the view to replace classroom teaching to AI learning, while 35.5% were not sure and answered ‘maybe’.

4.8.What Role of Teachers cannot be Replaced by AI Tools?

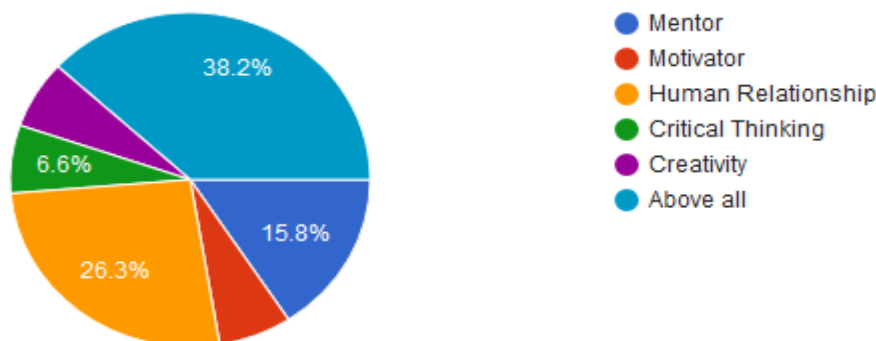


fig.4.8. Irreplaceable role of Teachers ,survey2020

Teachers as Mentor of students who guided them in different aspects was perceived as one of the most important factors which cannot be done by AI, 38.2% believed in above mentioned factor and Human Relationship Topped second in the reasons that students prefer Classroom Teaching to AI. 26.3% considered that Human relationship built in the process of Classroom Learning held significantly important. 15.8% believed that Role played by teachers as Mentors, Motivators, and Human Relationship built, Creativity and Critical Thinking all the above factors contribute to the essence of Classroom Teaching method.

4.9. Are AI tools supplement or Replacement in Learning?

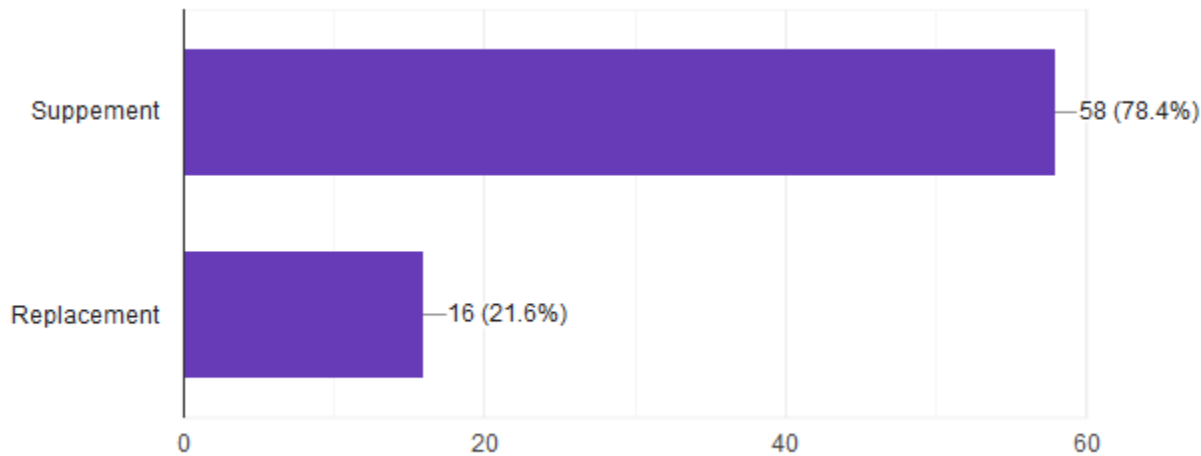


fig.4.9. AI virtual tools in learning supplement or replacement, survey, 2020

78.4% students considered AI tools to be used as a supplement to existing Classroom Teaching, it is not to be considered as a Replacement however 21.6% students perceived AI learning can be considered to be Replacement for Classroom Learning.

Conclusion

AI learning Applications are gaining popularity in the Higher Education in India. Now students learning is not confined to classroom alone rather Artificial Intelligence Applications are playing a significant role in the learning process. Artificial Learning tools are very much part of imparting education. As AI is in the infancy stage currently usage in education is mostly in addition to current existing classroom system. Even though it is preferred for factors like convenience, flexibility and personalization, overcoming obstacles like feeling of embarrassment by students in groups, benefits like repetition of a lecture as per convenience. Overcoming barrier of Time as availability of teachers is limited, The AI tools can be accessed 24/7 any time, students expressed use of these tools is more sought after during the time of examinations. However, students were of the view that they still want to continue with Classroom Education learning and it should not be replaced with Artificial Intelligence tools. rather AI methods of learning should be used as an additional as a supplement to classroom Learning. Students enjoy classroom experience inform of Human Interactions, relationships with peers and teachers which are formed during the classroom studies, Role of a teacher as Mentor and Motivator, Discussions, Creativity and critical thinking. Education is a domain largely ruled by human-to-human interaction, and integration of AI has been slower to develop the necessary human-like attributes of responsiveness, adaptability, and understanding. Yet there are plenty of areas where AI's inherent strengths help fill high-need "gaps" in learning and teaching.

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