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The Analysis of How Artificial Intelligence Has an Effect on Teachers and The Education System

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Abstract

Artificial intelligence has established a presence in every aspect of human activity, further demonstrating its preeminence over humans with each passing day. Artificial Intelligence (AI) has demonstrated its prowess in a variety of industries, including but not limited to healthcare, robotics, eCommerce, finance, navigation, education (E), and many more. This study will investigate the effects that artificial intelligence has had on the educational system, with a particular emphasis on how AI has changed the responsibilities that instructors play in the classroom. This study will also focus on examining whether or not the presence of AI in the educational system will take over the responsibilities that are traditionally filled by teachers. The incorporation of artificial intelligence into educational and instructional systems has resulted in significant improvements in terms of efficiency, precision, and variety of pedagogical approaches. It has also been demonstrated in a large number of studies that the most important factor in the achievement of AI domination in educational institutions is the role played by educators.

Keywords: Artificial intelligence (AI), Education (E), Teacher, Student, Learning Management System (LMS), Intelligent tutoring system (ITS), virtual reality, augmented reality (VR&AR), modern learning, Personalized learning

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1. Introduction

Education determines the quality of individual life. It improves one's knowledge skills and develops personality and attitude. Every man's education begins at home, and they gradually begin to acquire knowledge from schools. As a result, instructors are told to be the mothers in their classrooms. This demonstrates how important instructors may be in the educational system. Previously, when students were educated in temples, tools, and gurukuls, the sole source of information for the students was from the teachers. However, as time has passed, so has the educational system.

Technology has significantly impacted the educational system, transforming students' information sources to the internet, virtual learning, and numerous websites for enhanced understanding. Technology usage in the educational system has been the preferred way of learning for many generations. This led to the introduction of Artificial Intelligence into the system of education. The use of AI can give us apprehension about how learning happens, and it can change the way it is assessed. When computers can automate reasoning based on associations in data, two most important fundamentals take place;

these include (a)capturing data and detecting patterns and (b)providing access to instructional resources to automate designs. Hence, by making sure that there is fairness in accessing information by all the students. Implementing AI in the learning system has also solved one of the greatest problems prevailing in the country, where all can access knowledge, there is no discrimination, and students who have to stand outside the classrooms due to caste systems don't have to worry about their careers. Personalized learning, task automation, Smart automation, and 24*7 assistance with conversational AI are some of the prominent features offered by Artificial Intelligence in education. By the presence of all these technical aspects in the system, learning is made a more fun and reliable source for students in the present world.

1.1 Escalating Involvement of AI in Education

Educators seek technological enhancements for teaching that would be safe, effective, and scalable. They rapidly search for AI tools that are newly released in the market. Grammar checkers, sentence finishers, essay writers, voice assistants, chatGPT, and chatbots are some of the most widely used technological aids in the classroom. Artificial intelligence's data analysis capabilities mean it can assist teachers in tailoring lessons and assignments to each student's specific needs. Artificial intelligence (AI) can automate administrative duties like grading, allowing teachers more time to focus on student learning. Students can gain a more concrete understanding of abstract subjects through the use of VR and AR in the classroom. Intelligent software can help students around the clock. LMS (Learning Management System) is crucially used to stay updated with the advancements in education, which includes purposes like assigning coursework, communicating with students and parents, and tracking student progress. ITS (Intelligent Tutoring System) can function without a teacher and support the learner using different algorithms.

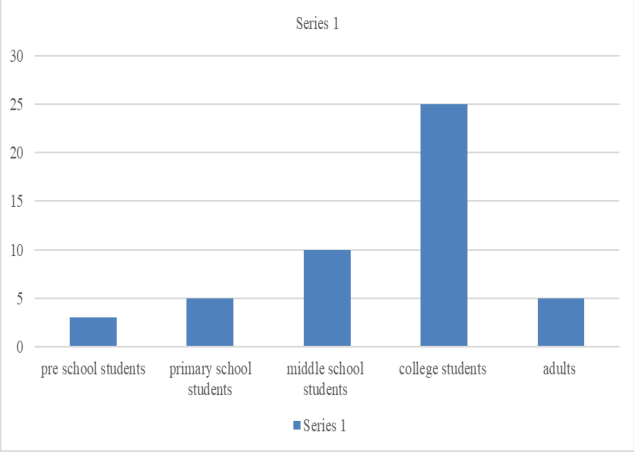

Fig. 1: Application of AI in Education

In Fig. 1, a bar graph is drawn to represent the use of AI in different sectors, and it is viewed that college students have much use of AI because AI can personalize the learning experience as per the students' needs. Secondly, Middle school students use AI more in their education as it is easy for the teachers to maintain the curriculum activities for the students, and the students can also get an innovative and interactive learning scheme.

1.2 Teaching methods

During the COVID-19 pandemic, the demand for remote learning has increased rapidly as most schools and colleges have been shut down for two years. This proportionally increased the demand for new tutoring methods; so, to develop new learning or tutoring methods, a perfect substitute for teachers and physical classes must be created so that the students will have the same interest, as usual, to continue learning and gain knowledge. This led to the introduction of AI into the education sector. AI-based tutoring methods promise to overcome the availability, cost, and location obstacles that students may face in human tutoring. AI can help avoid bias and make learning easier and more efficient. The tutoring methods that include AI are creating courses, offering personalized learning, enabling universal access, automating tasks, and promoting virtual learning. Hence, adapting to AI Tutoring has revolutionized the education industry.

1.3 Smart learning

Smart learning is the newest way implemented in the education sector to reform the education industry. Smart learning created ways for the students to have their own

pace of learning through online courses, recorded videos, assignments, and projects. Hence, the students don't have to worry about missing out on classes, and they can concentrate on their other passions while learning.

AIED is one of the emerging technologies in the field of education. AI has always been hailed as a solution for educational woes like lack of good teachers, underachieving students, the growing gap between the rich and the poor, and lack of proper schools in certain areas in the city can all be overcome by personalized learning, which was developed by the implementation of AI. These different features are depicted in Fig 2, like personalized learning, learning using virtual reality and augmented reality, online courses, online projects, and assignment submissions, teaching - bots that act as substitutes for teachers, and much more collectively form smart learning.

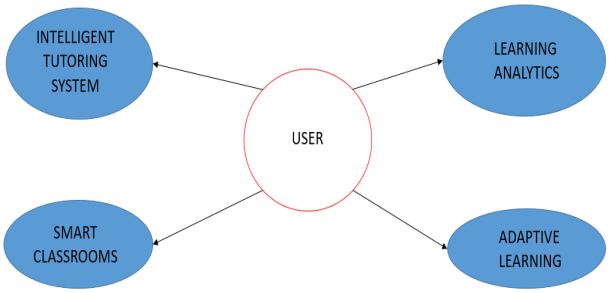

Fig. 2: The uses of smart learning in education

1.4. Traditional Learning and AI Learning

Traditional learning methods, which began in the early 19th century, primarily relied on teachers as the sole source of knowledge and followed a drill and rote memorization approach. Table 1 describes methods that give little or no scope for memorization. Traditional teaching methods often involve students listening to teachers and learning from them without any reference sources, primarily in a classroom setting. As the days passed, the teaching methods changed, and the learning requirements differed from student to student. To make learning easy for the students, the modern or AI mode of teaching is implemented, which gives a lot of room for critical thinking, and students can learn at their comfortable pace from their convenient place with the use of online classes or courses. Students can experiment with their knowledge in a particular subject and understand the subject even better, thus making learning more creative and innovative. As AI has become very popular in different sectors, it has also passed its influence over the education sector. In most parts of Western countries, schools and colleges have started using AI in their teaching methods. Assignment management systems by the computer, lecture videos, and project assigning systems are all controlled by the computer. Usage of books has become less day by day, hence giving rise to technology.

Table 1: Comparison between traditional learning and modern learning

Traditional Learning	Modern Learning
Teachers are responsible for teaching.	Individual learning methods
Only classroom teaching available	Outside-classroom teaching
no additional learning platforms	Many learning platforms
To all students, one teacher must teach	Individual student – personalized learning
No influence of AI	High influence of AI
No online classes	Many online classes present
No innovative projects or assignments online	Creative and innovative projects

2. Literature Review

With the increase in AI in education, many authors have come up with different perspectives and solutions on how AI has affected the education sector [1]. In the 2018 Horizon report [2], the German Research Centre for Artificial Intelligence (DFKI) highlights some of the authors, such as AI and adaptive learning technologies, as important developments in educational technology; likely, this wave of interest will soon have a significant impact on higher education institutions [3]. According to the authoritative textbook on AI, "All AI researchers should be concerned with the ethical consequences of their work," written by [4]. The following questions have been answered by previous research. How has the quantity and quality of academic writing on AI changed over time, where are the articles appearing, and what are the authors' backgrounds and fields of study? What are the ethical considerations, obstacles, and risks associated with the use of AI in the classroom, and how are these factors conceptualised? In the context of higher learning, what kinds of AI applications are there, and how broad are they?

> "This technology [AI] is already being introduced in the sphere of higher education, write Hinojo-Lucena, Aznar-Daz, Cáceres-Reche, and Romero-Rodrguez

[5], although many teachers are uninformed of its breadth and, above all, what it consists of [5]."

There is no consensus among AI researchers on a single definition and concept of AI - and intelligence in general [6] due to the interdisciplinary nature of the discipline [7]. Acemoglu and Restrepo's [8] definition of AI is quite comprehensive: "Computers capable of learning and problem-solving, two cognitive functions typically associated with human brains" "an area of artificial intelligence that contains software able to recognise patterns, generate predictions, and apply newly discovered patterns to circumstances that were not addressed or covered in their initial design," write Bass [9] to define machine learning. Personal instructors, intelligent support for collaborative learning, and intelligent virtual reality are only three examples of the many artificial intelligence (AI) software solutions currently being used in the classroom, as described by Bostrom [10]. While most AI research is conducted primarily in STEM domains, its rising applications in education (AIEd) necessitate interdisciplinary approaches [11].

Concerns have been raised by researchers over the lack of theoretical grounding and pedagogical frameworks in the nearly two decades of literature on artificial intelligence-enabled e-learning [12]. There is a significant chasm between the potential of AIEd technologies and their actual use in real-world classrooms [13]. Carefully examining the risks as well as the rewards, Matthew Lynch writes, "The use of AI in education is useful in some respects, but we must be hyper-vigilant in monitoring its progress and its overall role in the world." Loeckx hypothesised that AI might be a useful teaching tool since it would ease the workload of educators while providing students with high-quality educational opportunities. According to Van Lehn [14], there has been a growing movement to promote AI for its strategic educational usefulness. Zhang et al. [15] predict that as AI develops, new organisational forms will emerge to accommodate the changing professional roles of educators. Arbulu et al. [16] predict that such intelligent technologies will completely transform tomorrow's workplaces. Based on the work of Dede [17], "artificial intelligence" in this context refers to computers with the ability to see, recognise, learn, react, and solve problems.

Siemens and Gasevic [18] refer to a machine's capacity to mimic the intelligence displayed by humans by learning new tasks, responding to novel situations, solving problems, answering inquiries, and creating plans. Advances in computing and related technologies have led to widespread use of computers across the education sector and, more particularly, across a variety of institutional departments, as with the rise of computer-aided instruction and learning (CAI/L) in formal classroom settings. The use of AI in education has had far-reaching effects, including more effective and efficient school administration, global learning, individualized and tailored instruction, enhanced content, and reduced administrative burdens. Baker and Inventado [19] have collectively published a paper giving us insights into how deep learning has helped visually impaired students. With Deep learning increasing in the technology market, its application has been of great use to the public. Since “Education for all” is a right every citizen can take, Deep Learning has helped a lot to reach this goal; this model published by the researchers has helped in the early diagnosis of eye disease and helps for the cure. Thus, helping the visually impaired students to have a better vision. Technologies like artificial intelligence, deep learning, and machine learning can help citizens with their regular lives. Many smart devices that work on the principles of AI or DL have been implemented in recent times and have made lives very easy for visually impaired victims.

Web Intelligence (WI) and artificial intelligence (AI) research and development focus on different aspects that allow it to adapt to its environment and perform intelligent functions; these include machine learning to create distributed intelligence, striking a balance between Web technology and intelligent agent technology; and agent self-organization, learning, and adaptation. Artificial intelligence has been integrated into management, classroom teaching, and student assessment, as reported by Pardo and Siemens [20]. Descriptive investigations, such as those recounted by Anderson and Dill [21], rely on inferences and conclusions drawn from the results of thematic and content analysis, which requires a comprehensive critique of each text and the identification of recurring themes from a review of multiple texts. Sharma et al. defined artificial intelligence as robots with capabilities similar to human reasoning.

According to Ribeiro and Gómez-Bellido [22] definition and description, AI is the culmination of decades of research and development involving system designers, data scientists, product designers, statisticians, linguists, cognitive scientists, psychologists, and education experts, all of whom have collaborated to create education systems with varying degrees of intelligence and the capacity to carry out a variety of tasks, such as assisting educators and bolstering students' learning [23]. It's worth noting that Siemens et al. [24] descriptions of a mobile API called Android Neural Networks API for rapidly executing machine learning models are spot on. Teachers and students both benefit from the timely and tailored feedback provided by intelligent education systems. According to Luckin et al. [25], accounts are meant to make use of a number of different kinds of computing technology, particularly those that have to do with machine learning, in order to increase.

3. Existing Methods

Artificial intelligence has introduced many activities that improve the system of education, some of which include personalized learning, task automation, smart content creation, adaptable access, determining classroom vulnerabilities, 24*7 assistance with conversational AI, teaching bots, examinations in AI, and many more developments that have been made. Improvements made in education have developed an innovative and creative approach toward learning for students. Students, especially the underachievers, will be able to go at their own pace and understand the subject through online courses; teachers will also be able to use better materials that can create interest in children to learn better things, making school a fun place to gain knowledge [26].

4. Proposed Methods

Though many implantations of AI have been introduced in the education sectors, many more improvements can be made, like small-sized bits of study materials with lower storage so that many study materials can be used in the system at lower storage [27]. Teaching bots can be included in teaching that helps students ask and clarify doubts. More personalized study materials can be created so the students and teachers can plan their study materials, which makes it more user-friendly; these kinds of developments made in the future can help the education sector to prosper in a better manner [28-32]. As technology is growing daily and the need for AI in every field is increasing rapidly, it is also necessary to implement AI more in education [33-35].

4.1. Advantages and Disadvantages of AI in Education

Table 2: Advantages and Disadvantages of AI in education

Advantages	Disadvantages
AI will be able to analyze the required learning gaps easily	There is a presence of bias in the AI model learning
It can provide a completely personalized learning experience	There is also a potential for errors that cannot be resolved
Students can ask questions that can be responded to immediately by the teaching bots.	Errors can impact learning outcomes.
AI can provide timely-feedback and just – in time learning	There is less motivation for the students who prefer AI-based learning
It can provide an engaging learning environment	chatGPT cannot act as a substitute for teachers or peers
Using AI-based learning can save a lot of time for both students and teachers.	Lack of real-time feedback and interaction among the students
AI can also provide proper learning facilities for impaired students	AI-developed learning systems cannot address unique or complex situations

Table 2 describes how there are both pros and cons to the usage of AI in education [36]. Just as AI can benefit users with personalized learning and can create an entire world for VR and AR learning methods that are mostly preferred by students, it can also provide an extremely engaging environment with different assignments, projects, activities, and real-time examples that are easy to understand [37-41]. Generally, a student has to wait for his or her turn to ask questions, or some students might feel too introverted to ask questions; a teaching bot is a perfect solution for this where students can just write in their doubts or even ask their doubts using voice assistants and can instantly get a reply from the bot. On the other hand, AI in education can have its disadvantages, which include the students losing the real-time learning experience necessary for the students to build a strong platform with values, ethics, and manners [42-45]. Also, if any complex or unique situations arise, the AI cannot give solutions for such situations [46].

4.2. Applications of AI in Education

- Learning assistance
- Personalization and closing knowledge gaps
- Improved accessibility
- Outside classroom tutoring
- Automation of administrative tasks
- Improved grading system

5. Finding and Discussion

The methodology of this paper will include how different approaches were formulated to describe how Artificial Intelligence has been evolving in the education system over the past years [47-49]. During the initial years when education depended purely on the teachers, Ai had minimal or no use in the education sector. Over the years, with huge research, AI has been involved in the education sector to improve learning mechanisms [50]. The

following methodology was followed in different areas in the education sector:

Fig. 3: Methodology in different areas of the education sector

This diagrammatic representation shown in Fig. 3 gives us a brief idea about how AI was implemented in different fields of education, and further, a complete description of how each field works is made for a better understanding.

5.1. Teaching mechanism

Artificial Intelligence provides one of the best solutions for teachers by providing solutions that can reduce the knowledge gap between teaching and study materials. Hence, by making learning easy, creative, and innovative for the students. The AI tools will be able to maintain question banks, intelligent analysis, upload test analysis, organizational examination, select test questions, online exercises, and strengthen practice.

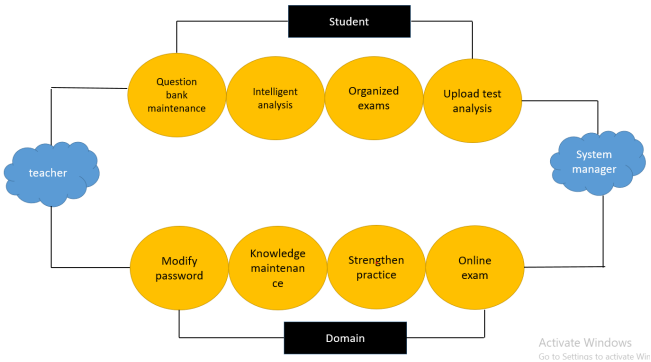

Fig. 4. Working of teaching mechanisms

Fig 4 gives us a clear idea of how teachers and students can use AI's teaching mechanisms. The system manager will manage all the activities available in the model, and the Domain is where the required data will be stored; once data is requested, it is fetched from the Domain. The teacher will be able to view and access all the activities provided; the teacher will act as a test case to use the model; the students will be able to access a few activities based on the permission given, as the student will not be able to access the test analysis but will be able to go through question banks, tests, etc. [51],

5.2. Personalized Learning

In today's generation, where students prefer individual learning, personalized learning has developed rapidly in the educational sector, with AI being the best possible solution to develop personalized learning. AI tools that provide the following activities to help personalized learning are learning Management Systems, Mapping and presentations, solving questions, extraction of data, and GUI to make the course look more interesting.

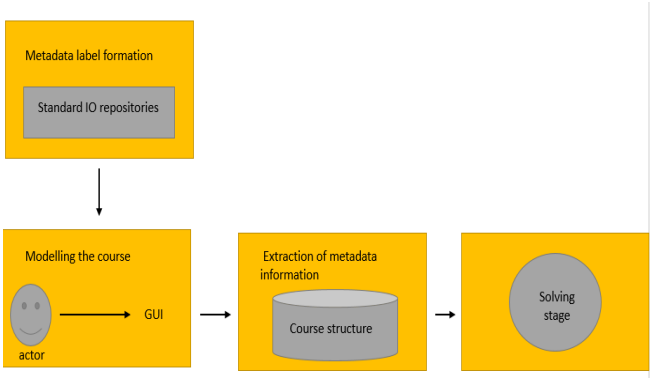

Fig. 5: Mechanism of personalized learning

In Fig. 5, a detailed diagrammatic representation of how personalized learning works internally is explained. There are four stages in the making of a personalized learning model. The first stage is the formation of data or storage of data; second, once the data is taken – a proper model for the required model is made using GUI and actors and other UML diagrams. The third step is to extract the data from the data stored in the model made, and finally, the solving stage, where the user uses it and performs the required tasks.

5.3. Parent-Teacher communication

For today's generation, the teacher must communicate with the parent about the student's academic progress. So that the parent and the teacher can be responsible for the progress in their studies, doing physical communication every time will become very tedious for both the teacher and the student. Hence, with the help of AI, communication becomes easy, where all the details about the student can be uploaded to a database, and the parent

will be able to constantly monitor the student's details through apps, a particular website, or messages [52-54].

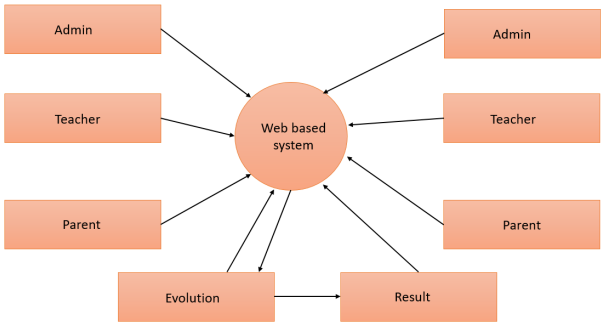

Fig. 6: Mechanism of parent-teacher communication

In Figure 6, the communication between parent and teacher is shown. A basic web-based system is created where the teacher and the student can communicate. The teacher gives in some data that the parent can view and will also be present in the same body [55-56]. Once a teacher evaluates the tests of students, the parent can view both the results and the evaluation. Hence making the communication transparent [57].

5.4. Feasibility Study

The project was a slow development over the years; many researchers have put forth many ideas, discoveries, and inventions that are the reasons for the present-day trend of AI in education [58-59]. The developments made over the years have had their ups and downs. Still, overall, the model of AI in education was a pure success as it benefitted large groups of students and teachers at a large scale, especially students who cannot afford good physical classes and can find it easy to learn through online classes. Hence, this has developed the lives of most students with bigger dreams to achieve. The teachers will also be able to use AI in their teaching to make their work easier and lower the burden of doing large and tedious tasks.

5.5. Legal and Ethical feasibility

Though AI has been very successful in the software world, the question of whether AI will take over the human world has always been a mystery. Considering the legal and ethical values, the teachers cannot be replaced by AI or computerized methods as the students can learn basic ethics, manners, and values only from the teacher, and they can also be their emotional guides. Teachers can also solve the unique and complex problems of the student that the computer cannot. Hence, maintaining legal feasibility is very important. AI has made many advancements in the world, like building a humanoid, etc., but at the end of the day, everything is made by humans. So, the replacement of humans cannot happen shortly.

5.6. Business feasibility

The market has accepted AI tremendously over the years. AI is applied in many fields like marketing, business, education, entertainment, etc. Considering the education sector, there has been a huge change in how learning methods have changed. For instance, students and teachers carried notebooks and textbooks as reference materials, but now instead, they all use laptops or tabs; tests were mostly conducted in pen and paper mode, whereas now we use online platforms that perform tests and evaluate in a much fair and just manner, Teaching methods have improved over the years from teachers teaching in the class to students now having most of the lectures available online thus creating a platform for personalized learning. Study materials and Doubt clarifications are not alone taken care of by the teachers but are now also done by teaching bots and online available study materials that the student can access easily and refer to whenever he or she needs it. The market has a rising demand for new ideas and methodologies that they are ready to try out in the education sector to attract more students to come and use their products.

6. Conclusion

This paper briefly describes how artificial intelligence has affected the role of teachers and the influence of AI in the education sector. There are pros and cons, advantages and disadvantages, and good and bad effects of implementing AI in education. Since the implementation of AI in different fields, a constant question has evolved: "Will AI dominate the human race?" this paper discusses whether AI has dominated the teachers' professions. The answer is no; although many advancements have been made in the education sector that have brought much glory to both students and hers, AI cannot dominate teachers. Teachers give students a moral education and make them follow the right path; besides academic knowledge, they also give them ethical values. Only when students attend physical classes do they get a sense of social interaction among their peers and teachers; at the same time, they can

participate in most of the social activities and be active participants. Otherwise, students tend to get introverted and will not be able to have proper interaction with anyone. Similarly, teachers can get the experience of teaching different students every day, which can improve their teaching capabilities over the years and be better at their profession.

AI can act as a substitute for the teachers by providing some facilities like personalized learning, learning assistance, online tests, test evaluation programs, parent-teacher communication, teaching, and doubt clarification bots, outside classroom teaching, easy administrative tasks, easy access to study materials, easy student details collection for easy reference of teachers and many more. AI always keeps improving and developing itself based on the industry's requirements. So, AI is a software tool that never gets worn out, unlike any hardware tool, so it keeps updating itself based on the requirements. So, to first prepare a proper AI model for a given requirement in the education sector, one must first understand the requirement and then draw the requirement architectural or UML diagrams to understand the proper model to make; for this to happen, a pure requirement of well-skilled people or teacher is required for the development of the proper model, apart from this every time an AI model gets released in the market, it needs to be tested with the help of some test cases to see if it works properly or not, so In this scenario, the teachers act as a test case by using the AI model and observing its pros and cons, then giving feedback to the makers of the product so that they can make the required changes and release the model back into the market, this process continues for a set of times, and if there is a proper response then the model is kept in the market, else it is discarded. This analysis shows that teachers play a very important role in the education sector, either with the implementation of AI or without the implementation of AI.

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