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ARTIFICIAL INTELLIGENCE AND IT'S IMPACT IN THE FIELD OF EDUCATION

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Abstract: Artificial Intelligence (AI), simply was a fantasy in the past and as the time passed its role has been changed. Whereas, in present it's a subject of development and in the future it will grow in one of the basic necessities of humans. Moreover, with this ongoing pace the community and the society has to become aware regarding the subject completely. Therefore, this treatise depicts the history, fundamentals, and applications of artificial intelligence, including its impact in the field of education, in addition with the perspective of students and teachers regarding the same by conducting a survey. Firstly, the thesis tracks the initial versions and theories explaining AI and later its phase of development in addition with its basic aim. Secondly, elaborating the classifications of AI in terms of each of its aspect and then there is the overview of functions of AI and its key terms and the concepts supporting AI. Finally, depicting the functions and roles AI plays or could play in the field of education, including the benefits and the challenges that could rise.

Index Terms - **Artificial Intelligence, History, Applications of AI, Field of Education**

I. INTRODUCTION

The acceleration established and maintained by the scientists and technology lovers in this age of digitalization has always been the point of appreciation and also inspiration to expand. Moreover, with the same spirit, artificial intelligence (AI) has experienced a massive surge by not only giving, machines a human thinking and processing but also the field of study and development to humans. However, with the advancement in the technology and the ease in the lifestyle, work, and industries, there comes the responsibility and pressure of letting this technology not overcome the power of commands by the programmers and maintaining the steady growth respectively. Even more, this control gains a prominent height when the robots with AI are predetermined to be used in the field of education, as replacing or employed along with the teachers to make students study. The field of education has been the most prominent and of sheer importance from always, and especially in a country like India, where the teachers are considered as the second parents of the children, the rise of AI would not be an easy task for sure.

This document was drawn up for making people able to understand and connect with AI, given that the complexity of the topic with changes happening at an exponential and unpredicted rate. To do so, it gives a detailed information and explanation about the history and introduction of AI, followed by its applications, fundamentals and its future scope and progress. Furthermore, it introduces the current functions of AI in the field of education and discusses its role in the coming future.

This paper is divided into three sections.

- ♦ **Section 1 –**Introduction and History of AI
- ♦ **Section 2 – Fundamentals and Applications of AI**
- ♦ **Section 3 –**AI in the field of Education

II. INTRODUCTION AND HISTORY OF AI

Less than a decade after breaking the Nazi encryption machine Enigma and helping the Allied Forces win World War II, mathematician Alan Turing changed history a second time with a simple question: "Can machines think?" **Error! Reference source not found.**Turing's paper "Computing Machinery and Intelligence" (1950), and its subsequent Turing Test, established the fundamental goal and vision of artificial intelligence. But still, what is AI?**Error! Reference source not found.** [3]**Error! Reference source not found.Error! Reference source not found.Error! Reference source not found.Error! Reference source not found.Error! Reference source not found.Error! Reference source not found.Error! Reference source not found.Error! Reference source not found.**Truthfully, the

answer of this question really depends on the person one asks[9], however at its core, AI is the branch of computer science that aims to stimulate the human intelligence in machines that are programed to think like humans and mimic their actions[3]. The term may also be applied to any machine that exhibits traits associated with a human mind such as learning and problem-solving. The ideal characteristic of artificial intelligence is its ability to rationalize and take actions that have the best chance of achieving a specific goal. [30]Consequently, the expansive goal of artificial intelligence has given rise to many questions and debates. So much so, that no singular definition of the field is universally accepted. So let's take a look at the history behind the progress and the development in the field of AI.

The idea of inanimate objects coming to life as intelligent beings (basically AI) began in antiquity, with superstitions, fiction, and rumors about robots and artificial beings in ancient Greece, where a legendary king and a sculptor Pygmalion conceived a son, named Golem with a statue Galatea who was somehow brought to life after making offerings to the goddess at the temple of Venus. By the 19th century, ideas about artificial men and thinking machines were developed in fiction, as in Mary Shelley's Frankenstein and speculation, such as Samuel Butler's, 'Darwin among the Machines'. Moreover, in the first half of the 20th century, science fiction movies familiarized the world with the concept of artificially intelligent robots. It began with the 'heartless' Tin man from the Wizard of Oz and continued with the humanoid robot that impersonated Maria in Metropolis. [34]

The seeds of modern AI were planted by classical philosophers who attempted to describe the process of human thinking as the mechanical manipulation of symbols, which culminated the invention of the Programmable Digital Computer in the 1940s, a machine based on the abstract essence of mathematical reasoning, which indeed inspired a handful of scientists to begin seriously discussing the possibility of building an electronic brain. The earliest research into thinking machines was inspired by a confluence of ideas, such as Norbert Wiener's cybernetics described control and stability in electrical networks, Claude Shannon's information theory described digital signals (i.e., all-or-nothing signals), Alan Turing's theory of computation showed that any form of computation could be described digitally. Following this, In 1950 Alan Turing published a landmark paper (Computing Machinery and Intelligence) in which he speculated about the possibility of creating machines that think. [34][15]He noted that "thinking" is difficult to define and devised his famous Turing Test. It was that if a machine could carry on a conversation (over a teleprinter) that was indistinguishable from a conversation with a human being, then it was reasonable to say that the machine was 'thinking'. However, the field of AI research wasn't formally founded until the summer of 1956, at a conference at Dartmouth College, in Hanover, New Hampshire, hosted by two of the best cognitive scientists John McCarthy and Marvin Minsky. At the conference, Allen Newell, Cliff Shaw, and Herbert Simon presented, 'Logic Theorist' a program designed to mimic the problem solving skills of a human, which is considered by many to be the first ever artificial intelligence program. Moreover, at that historic conference, McCarthy, imagining a great collaborative effort, brought together top researchers from various fields for an open ended discussion on Artificial Intelligence, the term which he coined at the very event.[1] [5]

From 1956 to 1974, AI flourished and the span became its golden years. The programs developed were simply astonishing for the people, as computers were solving algebra word problems, proving theorems in geometry and learning to speak English. These successes, as well as the advocacy of leading researchers (namely the attendees of the DSRPAI) convinced Government agencies such as the Defense Advanced Research Projects Agency (DARPA) to fund AI research at several institutions, which made researchers expressing an intense optimism in private and in print, predicting that a fully intelligent machine would be built in less than 20 years. However, breaching the initial fog of AI revealed a mountain of obstacles; the biggest was the lack of computational power to do anything substantial: computers simply couldn't store enough information or process it fast enough. Moreover, in the 1970s, AI was subject to critique and financial setbacks. AI researchers had failed to appreciate the difficulty of the problems they faced. Their tremendous optimism had raised expectations impossibly high, and when the promised results failed to materialize, funding for AI disappeared– a period from 1974–80 that became known as the 'AI winter'. This cleared that achieving an artificially intelligent being will not be so simple. However, in the 1980s a form of AI program called 'expert systems' was adopted by corporations around the world and knowledge became the focus of mainstream AI research, and with this the field revived when the British government started funding it again in part to compete with efforts by the Japanese to fund AI. Nevertheless, the business community's fascination with AI rose and fell in the 1980s in the classic pattern of an economic bubble, as a result, the field experienced another major winter from 1987 to 1993, coinciding with the collapse of the market for some of the early general-purpose computers and reduced government funding. [1] [34][15]

From 1993 to 2011, the field of AI, more than a half a century old, finally achieved some of its oldest goals. It began to be used successfully throughout the technology industry. Some of the success was due to increasing computer power and other was achieved by focusing on specific isolated problems and pursuing them with the highest standards of scientific accountability. Still, the reputation of AI, in the business world at least, was less than pristine. However, in 1997, IBM's Deep Blue became the first computer to beat a chess champion when it defeated Russian Grandmaster Garry Kasparov. And in 2011, the computer giant IBM's question-answering system Watson won the quiz show 'Jeopardy!' by beating reigning champions Brad Rutter and Ken Jennings. Together, all these factors helped to fragment AI and offered a bit of an explanation to the roller coaster of AI research and as a result, AI became both more cautious and more successful than it had ever been. [1] [34][15]

As technology advances, previous benchmarks that defined artificial intelligence became outdated. For example, machines that calculate basic functions or recognize text through optimal character recognition are no longer considered to embody artificial intelligence, since this function was now taken for granted as an inherent computer function.AI was continuously evolving to benefit many different industries. Machines are wired using a cross-disciplinary approach based in mathematics, computer science, linguistics, psychology, and more. [1] [34][15]

III. FUNDAMENTALS AND APPLICATIONS OF AI

After studying a lot about history and the introduction of AI, now it's the time to know something more about AI. Therefore, in this section, let's discuss its classifications. This will be followed by the fundamentals, applications, benefits and risks of AI

In the twenty-first century, AI's rapid growth and powerful capabilities have made people paranoid about the inevitability and the proximity of an AI takeover, as they have become an essential part of the technology industry, helping to solve many challenging problems in computer science, software engineering and operations research. However, understanding the types of AI that are possible and the types that exist now will give a clearer picture of the existing AI capabilities and the long road ahead for its research.[5]

With their textbook 'Artificial Intelligence: A Modern Approach', authors Stuart Russell and Peter Norvig unified their work around the theme of intelligent agents in machines and go on to explore four different approaches that have been the pillars in the development of AI: Thinking humanly, Thinking rationally, Acting humanly, Acting rationally.[3] The first two ideas concern thought processes and reasoning, while the others deal with the behavior. Moreover, since the field of AI promises to develop machines imitating human-like functioning, the extent to which an AI system replicates human capabilities is used as the criterion for determining the types of AI. And under such a system, an AI that can perform more human-like functions with equivalent levels of proficiency will be considered as a more evolved type of AI, while an AI that has limited functionality and performance would be considered a simpler and less evolved type. Based on this criterion, there are two ways in which AI is generally classified. One type is based on classifying AI and AI-enabled machines based on their likeness to the human mind, and their ability to "think" and perhaps even "feel" like humans. And based on this classification, there are four types of AI or AI-based systems: reactive machines, limited memory machines, theory of mind, and self-aware AI. Whereas, the alternate system of classification that is more generally used in tech parlance is the classification of the technology into Artificial Narrow Intelligence (ANI), Artificial General Intelligence (AGI), and Artificial Super intelligence (ASI).[12]

1. **Reactive Machines**: This is the oldest and most basic form of AI having extremely limited capabilities with no ability to store memories or using past experiences to determine future actions i.e., these machines do not have the ability to 'learn'. They simply emulate the human mind's ability to respond to different kinds of stimuli, which makes these machines appropriate only to be used for automatically responding to a limited set or combination of inputs. A popular example of a reactive AI machine is IBM's Deep Blue, a machine that beats chess Grandmaster Garry Kasparov in 1997. [12][10][20][22][23]

2. **Limited Memory**: These are the machines which are capable of learning from historical data to make decisions and are comprised of machine learning models. Moreover, nearly all existing applications that we know of come under this category of AI. All the present day AI systems, such as those using deep learning, are trained by large volumes of training data that they store in their memory to form a reference model for solving future problems. For example, almost all present-day AI applications, from Chabot and virtual assistants to self-driving vehicles are all driven by limited memory AI. [12][10][20][22][23]

3. **Theory of Mind**: It is the next level of AI systems that researchers are currently engaged in innovating. This level of AI will be able to better understand the entities it is interacting with by discerning their needs, emotions, beliefs, and thought processes, through recognizing you as a conscious agent with a mental world of your own, rather than something purely mechanistic and inanimate. Achieving, Theory of Mind level of AI will require development in its other branches as well, because, AI machines will have to perceive humans as individuals whose minds can be shaped by multiple factors, essentially 'understanding'. [12][10][20][22][23][2]

4. **Self Awareness**: This is the final stage of AI development which currently exists only hypothetically and aims to build systems that can form representations about themselves. Ultimately, the AI researchers will have to not only understand consciousness, but build machines that have it. This is, in a sense, an extension of the 'theory of mind', as without a theory of mind, we could not make those sorts of inferences. And as a result, this type of AI will not only be able to understand and evoke emotions in those it interacts with, but also has emotions, needs, beliefs, and potential desires of its own. [12][10][20][22][23]

5. **Artificial Narrow Intelligence (ANI):** Sometimes referred to as 'Weak AI', is what we see all around us in the computers today: all the existing AI, including even the most complicated and capable AI that has ever been created to date. It is often focused on performing a single task extremely well without being explicitly programmed how to do so. These systems correspond to all the reactive and the limited memory AI, even the most complex AI that uses machine learning and deep learning to teach itself falls under ANI. A few examples of Narrow AI include, Google search, Image recognition software, Siri, Alexa and other personal assistants, Self-driving cars, and the list goes on and on. [12][10][20][22][23]

6. **Artificial General Intelligence (AGI):** Sometimes referred to as 'Strong AI', simply is the kind of artificial intelligence we see in the movies like the robots from Westworld, Data from Star Trek: The Next Generation, HAL in 2001 or Skynet in The Terminator, but which doesn't exist today and AI experts are fiercely divided over how soon it will become a reality. However, it is the ability of an AI agent to learn, perceive, understand, and function completely like a human being, by adapting the intellect found in humans, a flexible form of intelligence capable of learning how to carry out vastly different tasks. [12][10][20][22][23]

7. **Artificial Super Intelligence (ASI):** It is the hypothetical AI that doesn't just mimic or understand human intelligence and behavior; ASI is where machines become self-aware and surpass the capacity of human intelligence and ability. Moreover, the development of Artificial Super intelligence will probably mark the pinnacle of AI research, as it will become by far the most capable forms of intelligence on earth. In addition to, replicating the multi-faceted intelligence of human beings, ASI will be exceedingly better at everything they do because of overwhelmingly greater memory, faster data processing and analysis, and decision-making capabilities. And while the potential of having such powerful machines at our disposal seems appealing, these machines may also threaten our existence or at the very least, our way of life. [12][10][20][22][23]

So basically at this time, it is hard to picture the state of our world when more advanced types of AI come into being. However, it is clear that there is a long way to get there as the current state of AI development compared to where it is projected to go is still in its rudimentary stage. Despite the, continuous and groundbreaking achievements in the field of AI all around the world, it has come under the scrutiny

from the scientist and public alike from its very beginning. The common theme behind this has been the idea that the machines will become so highly developed that humans will not be able to keep up and they will take off on their own, redesigning themselves at an exponential rate. With the list going on, another is that machines can hack into people's privacy and they can use it as their weapon. Furthermore, debates have been happened regarding the ethics of artificial intelligence and whether intelligent systems such as robots should be treated with the same rights as humans. And for those who are optimistic about the future of AI, the fact that we've merely scratched the surface of AI development makes the future even more exciting.[25] [5]

While discussing the classification of AI around each and every aspect and understanding the basic pillars on which it is classified above, we have got a deep and thorough idea regarding AI. Moreover, during this we used some of the key terms which are either the stem of AI or the basic concept developing it. There are various concepts and terms which play an enormous and pertinent role in the development of AI to this extent, and ahead we tend to highlight their theme and role in the same.

- **Big Data:** Firstly, Big Data implies working with data that is, well…big and yet grows exponentially with time. And as a fact, in the past year, we've generated more data than in all the years of human history. Basically, it's a combination of structured, semi-structured and unstructured data collected by organizations that can be mined for information and used in various projects such as predictive modeling and other advanced analytics applications. So before understanding the relation between AI and Big Data, first we need to know the importance of Big Data. The importance of it doesn't lie around the amount of data we have, but what we do with it. We can take data from any source and analyze it to find a solution that enables cost and time reductions, optimized offerings, and smart decision making. But how it's related to AI? Simply putting, both AI and Big Data complement each other's functioning. The AI becomes more and more efficient with the increasing amount of data. It's helping organizations understand their customers a lot better, even in ways that were impossible in the past. On the other hand, big data is simply useless without software to analyze it. Humans can't do it meticulously. [7][18][24][26] [25]
- **Machine Learning (ML):** It is the study of computer algorithms that improve automatically through experience without being explicitly programmed. Moreover, it is even seen as a subset of Artificial Intelligence. Machine learning focuses on the development of computer programs that can access data and use it to learn for themselves. The process of learning begins with observations or data, such as examples, direct experience, or instruction, in order to look for patterns in data and make better decisions in the future based on the examples that we provide. The primary aim is to allow the computers learn automatically without human intervention or assistance and adjust actions accordingly. But, using the classic algorithms of machine learning, text is considered as a sequence of keywords; instead, an approach based on semantic analysis mimics the human ability to understand the meaning of a text. However, the researchers look at ML as computational statistics, or using data to create mathematical models that are useful for making predictions. Great applications for this approach include predictive maintenance and detection of security anomalies. [4][33] [25]
- **Deep Learning:** It's an Artificial Intelligence function that imitates the workings of the human brain in processing data and creating patterns for use in decision making. Deep learning is a class of machine learning algorithms that uses multiple layers to progressively extract higher level features from the raw input. For example, in image processing, lower layers may identify edges, while the higher layers may identify the concepts relevant to a human such as digits or letters or faces. Deep learning, a subset of machine learning, utilizes a hierarchical level of artificial neural networks to carry out the process of machine learning. While traditional programs build analysis with data in a linear way, the hierarchical function of deep learning systems enables machines to process data with a nonlinear approach. [8][32] [25]
- **Artificial Neural Networks (ANN):** ANN simply called as Neural Networks (NN) is either a system software or hardware that works similar to the tasks performed by neurons of the human brain. Hence, these are brain-inspired networks of interconnected layers of algorithms, called neurons, that feed data into each other, and which can be trained to carry out specific tasks by modifying the importance attributed to input data as it passes between the layers. The original goal of the ANN approach was to solve problems in the same way that a human brain would. Neural networks have a remarkable ability to retrieve meaningful data from imprecise data, that is used in detecting trends and extract patterns which are difficult to understand either by computer or humans. A trained NN can be made an 'expert' in information that has been given to analyze and can be used to provide projections. It is these deep neural networks that have fuelled the current leap forward in the ability of computers to carry out task like speech recognition and computer vision.[28][31] [25]
- **Natural Language Processing (NLP):** As we all know computer understands the binary language, and it becomes quite difficult at times for humans to communicate it with that. Hence, a technology is developed to resolve the problem known as Natural Language Processing (NLP). So basically, it's the technology which is used to aid computers to understand the human's natural language. It combines the power of linguistics and computer science to study the rules and structure of language, and create intelligent systems capable of understanding, analyzing, and extracting meaning from text and speech. Moreover, NLP plays a very important role in structuring big data because it prepares text and speech for machines so that they're able to interpret, process, and organize information. Consequently, Natural Language processing is considered a difficult problem in computer science. It's the nature of the human language that makes NLP difficult. The rules that dictate the passing of information using natural languages are not easy for computers to understand. Some of these rules can be high-leveled and abstract; for example, when someone uses a sarcastic remark to pass information. On the other hand, some of these rules can be low-leveled; for example, using the character 's' to signify the plurality of items. While humans can easily master a language, the ambiguity and imprecise characteristics of the natural languages are what makes NLP difficult for machines to implement. [6][19] [25]

Now, after looking at the basics and the fundamental terms revolving around the field of AI; lets again know something about the impact and the perspective of the world about AI.As with most changes in life, there will be positive and negative impacts on society and so is with AI as it continues to transform the world we live in. In the near term, the goal of keeping AI's impact on society beneficial motivates research in many areas, from economics and law to technical topics such as verification, validity, security and control. Whereas, in the

long term, an important question is what will happen if the quest for strong AI succeeds and an AI system becomes better than humans at all cognitive tasks. Such a system could potentially undergo recursive self-improvement, triggering an intelligence explosion leaving human intellect far behind. By inventing revolutionary new technologies, such a super intelligence might help us eradicate war, disease, and poverty, and so the creation of strong AI might be the biggest event in human history.[9]

Most researchers agree that a super intelligent AI is unlikely to exhibit human emotions like love or hate, and that there is no reason to expect AI to become intentionally benevolent or malevolent. Instead, when considering how AI might become a risk, experts think two scenarios most likely, first the AI is programmed to do something devastating and second the AI is programmed to do something beneficial, but it develops a destructive method for achieving its goal. Artificial intelligence algorithms are powered by data. As more and more data is collected about every single minute of every person's day, our privacy gets compromised. Moreover, by looking from a different side Artificial intelligence will definitely cause our workforce to evolve. The alarmist headlines emphasize the loss of jobs to machines, but the real challenge is for humans to find their passion with new responsibilities that require their uniquely human abilities. The idea that the quest for strong AI would ultimately succeed was long thought of as science fiction, centuries or more away. However, thanks to recent breakthroughs, many AI milestones, which experts viewed as decades away merely five years ago, have now been reached, making many experts take seriously the possibility of super intelligence in our lifetime. Finally, because AI has the potential to become more intelligent than any human, we have no surefire way of predicting how it will behave. As an optimist at heart, I believe the changes will mostly be good but could be challenging for some.[17][27]

Nevertheless, along with the risks and challenges there would be more of the benefits and the positive impact of AI on the society. Artificial intelligence can dramatically improve the efficiencies of our workplaces and can augment the work humans can do. When AI takes over repetitive or dangerous tasks, it frees up the human workforce to do work they are better equipped for—tasks that involve creativity and empathy among others. If people are doing work that is more engaging for them, it could increase happiness and job satisfaction. With better monitoring and diagnostic capabilities, artificial intelligence can dramatically influence healthcare. By improving the operations of healthcare facilities and medical organizations, AI can reduce operating costs and save money. The true impact will be in the care of patients. Potential for personalized treatment plans and drug protocols as well as giving providers better access to information across medical facilities to help inform patient care will be life-changing. Moreover the cost of treatment will also be reduced dramatically. The way we uncover criminal activity and solve crimes will be enhanced with artificial intelligence. Facial recognition technology is becoming just as common as fingerprints. The use of AI in the justice system also presents many opportunities to figure out how to effectively use the technology without crossing an individual's privacy. Our society will gain countless hours of productivity with just the introduction of autonomous transportation and AI influencing our traffic congestion issues. [17][27]

IV. AI IN THE FIELD OF EDUCATION

The field of education has always been considered the most pertinent and respectable field universally. This is the only field which has changed the world in the way it is now, whether it is humanity or the technology all the developments achieved by humans is an ultimate outcome of it. Accordingly, one of the most important and life changing achievement of humans is Artificial Intelligence, and in near future will be the reward. However, for decades, science fiction authors, futurists, and movie makers alike have been predicting the amazing (and sometimes catastrophic) changes that will arise with the advent of widespread artificial intelligence. So far, AI hasn't made any such crazy waves, and in many ways has quietly become ubiquitous in numerous aspects of our daily lives. While we've yet to create self-aware robots like those that pepper popular movies, we have made smart and often significant use of AI technology in a wide range of applications that, while not as mind-blowing as androids, still change our day-to-day lives. One place where artificial intelligence is poised to make big changes is in the field of education, because AI has been around for about 30 years, it is still unclear for educators how to make pedagogical advantage of it on a broader scale, and how it can actually impact meaningfully on teaching and learning in higher education. [13][14][16][21][29][35] [11]

Artificial Intelligence is now a part of our normal lives. We are surrounded by this technology from automatic parking systems, smart sensors for taking spectacular photos, and personal assistance. Similarly, Artificial Intelligence in education is being felt, and the traditional methods are changing drastically. While we may not see humanoid robots acting as teachers within the next decade, there are many projects already in the works that use computer intelligence to help students and teachers get more out of the educational experience. In fact, many researchers claim that Artificial Intelligence and Machine Learning can increase the level of education. Artificial intelligence (AI) applications in education are on the rise and have received a lot of attention in the last couple of years. It has already been applied to education primarily in some tools that help develop skills and testing systems. As AI educational solutions continue to mature, the hope is that AI can help fill needs gaps in learning and teaching and allow schools and teachers to do more than ever before. The academic world is becoming more convenient and personalized thanks to the numerous applications of AI for education. This has changed the way people learn since educational materials are becoming accessible to all through smart devices and computers. Since the students of today will need to work in a future where AI is the reality, it's important that our educational institutions expose students to and use the technology. [13][14][16][21][29][35] [11]

Adjusting learning based on an individual student's particular needs has been a priority for educators for years, but the AI will allow a level of differentiation that's impossible for teachers who have to manage an average of 30 students in each class. As AI gets more sophisticated, it might be possible for a machine to read the expression that passes on a student's face that indicates they are struggling to grasp a subject and will modify a lesson to respond to that. The idea of customizing curriculum for every student's needs is not viable today, but it will be for AI-powered machines. The uses and the roles AI can play or has started playing does not end here, there are several more of them. Artificial intelligence tools can help make global classrooms available to all including those who speak different languages or who might have visual or hearing impairments. This also opens up possibilities for students who might not be able to attend school due to illness or who require learning at a different level or on a particular subject that isn't available in their own school. Moreover, an educator

spends a tremendous amount of time grading homework and tests. AI can step in and make quick work out of these tasks while at the same time offering recommendations for how to close the gaps in learning. There is much potential for AI to create more efficient enrollment and admissions processes. Furthermore, the educational software can be adapted to student needs. From kindergarten to graduate school, one of the key ways artificial intelligence will impact education is through the application of greater levels of individualized learning. These systems respond to the needs of the student, putting greater emphasis on certain topics, repeating things that students haven't mastered, and generally helping students to work at their own pace, whatever that may be. Adaptive learning has already had a huge impact on education across the nation, and as AI advances in the coming decades, adaptive programs like these will likely only improve and expand. Likewise, it can point out the areas where the courses need to be improved. Teachers may not always be aware of gaps in their lectures and educational materials that can leave students confused about certain concepts. Artificial intelligence offers a way to solve that problem. This type of system can help to fill in the gaps in explanation that can occur in courses, and helps to ensure that all students are building the same conceptual foundation. Rather than waiting to hear back from the professor, students can get immediate feedback that helps them to understand a concept and remember how to do it correctly the next time around. [13][14][16][21][29][35] [11]

There will always be a role for teachers in education, but what that role is and what it entails may change due to new technology in the form of intelligent computing systems. As we've already discussed, AI can take over tasks like grading, can help students improve learning, and may even be a substitute for real-world tutoring. Yet AI could be adapted to many other aspects of teaching as well. AI systems could be programmed to provide expertise, serving as a place for students to ask questions and find information or could even potentially take the place of teachers for very basic course materials. In most cases, however, AI will shift the role of the teacher to that of facilitator. Additionally, trial and error is a critical part of learning, but for many students, the idea of failing, or even not knowing the answer, is paralyzing. Some simply don't like being put on the spot in front of their peers or authority figures like a teacher. An intelligent computer system, designed to help students to learn, is a much less daunting way to deal with trial and error. Artificial intelligence could offer students a way to experiment and learn in a relatively judgment-free environment, especially when AI tutors can offer solutions for improvement. In fact, AI is the perfect format for supporting this kind of learning, as AI systems themselves often learn by a trial-and-error method. Precisely, smart data gathering, powered by intelligent computer systems, is already making changes to how colleges interact with prospective and current students. From recruiting to helping students choose the best courses, intelligent computer systems are helping make every part of the college experience more closely tailored to student needs and goals. Initiatives are already underway at some schools to offer students AI-guided training that can ease the transition between college and high school. Who knows but that the college selection process may end up a lot like Amazon or Netflix, with a system that recommends the best schools and programs for student interests While major changes may still be a few decades in the future, the reality is that artificial intelligence has the potential to radically change just about everything we take for granted about education. Using AI systems, software, and support, students can learn from anywhere in the world at any time, and with these kinds of programs taking the place of certain types of classroom instruction, AI may just replace teachers in some instances (for better or worse). Ultimately, education could look a whole lot different a few decades from now. [13][14][16][21][29][35] [11]

AI and education go hand in hand and the new techniques could be all that is required to ensure that all students attain their ultimate academic success. Smart content is a very hot subject matter today. Robots can produce digital content of similar quality as what different AU essay writing services can create AI systems are using traditional syllabuses to create customized textbooks for certain subjects. As a result, textbooks are being digitized, and new learning interfaces are being created to help students of all academic grades and ages. An example of such mechanisms is the Cram101 which uses AI to make textbook contents more comprehensible and it is easy to navigate with summaries of the chapters, flashcards, and practical tests. There are a lot of tech-driven solutions in the education industry, these platforms can analyze the level of knowledge, offer backward communication, provide a plan for improvements, and so on. Some of them include, Third Space Learning, Little Dragon, Carnegie Learning, and several more. [13][14][16][21][29][35] [11]

We all know, every change or progress comes with both pros and cons, it could either be balanced or one overweighing other. So definitely, there are some disadvantages and challenges which have to be faced in the field of education by AI researchers. Starting with, the fact that when humans do a certain task for multiple times, they eventually become better at it. So, if a teacher has spent years teaching a class, he will get better at his job every day. Robots work by the algorithm that is not influenced by the repetition of the task. Therefore, their experience doesn't matter and doesn't make them any better. Moreover, a school is traditionally a place where a kid has to dump his mobile phone and get to open a same old book. With tech implemented in every classroom, kids won't be able to imagine their lives without it. As a result, in a few decades, we'll get a bunch of socially-unadapted technology-addicted adults. Furthermore, teaching is one of the biggest professional branches — there are over 15, 00, 00.000 educators in the India alone. One can only imagine how the replacement of teachers by robots would be met by all the instructors. And already having such a high rate of unemployment the risk of letting go such a high number of jobs would make it worse. Furthermore, we use so much help from machines that our own abilities shrink. So, there's a risk that we will use machines not because it's more convenient, but because we can't do it the other way. And more importantly, Robots and other AI learning tools will require a student to have a tablet or a laptop. However, not every student has these gadgets. As soon as the government doesn't fund all the technological implementations, which will simply widen the rich-poor gap. Moreover, it yet remains a question whether students will be invested in education and motivated enough to study when teachers are not there to supervise. Sometimes it's the wish to impress a particular teacher that makes a kid eager to prepare for the lesson. Will the excitement remain with a robot as an assistant? That's yet for us to find out. [13][14][16][21][29][35][11]

V. RESEARCH METHODOLOGY

To get a better and deeper understanding of the impact and the role which could be played by AI in the field of education, we must know the perspective and the views of the characters involved in the field i.e. students and the teacher. Hence, for that the researcher conducted a survey cum interview with 35 students and teachers questioning them the same 15 questions framed to know their opinion about the same. Moreover, it had been quite challenging and interesting to do this survey in India, because here in India students have been always considered the teachers as their second parents and school their second home. As, the technology and digitalization is different and is not yet updated in comparison to the rest of the world, this survey becomes more fun. This survey will also show us the difference between the thoughts of both students and teachers regarding the matter.

1) **As an educator, how do you opine about AI?**

STUDENTS   TEACHERS
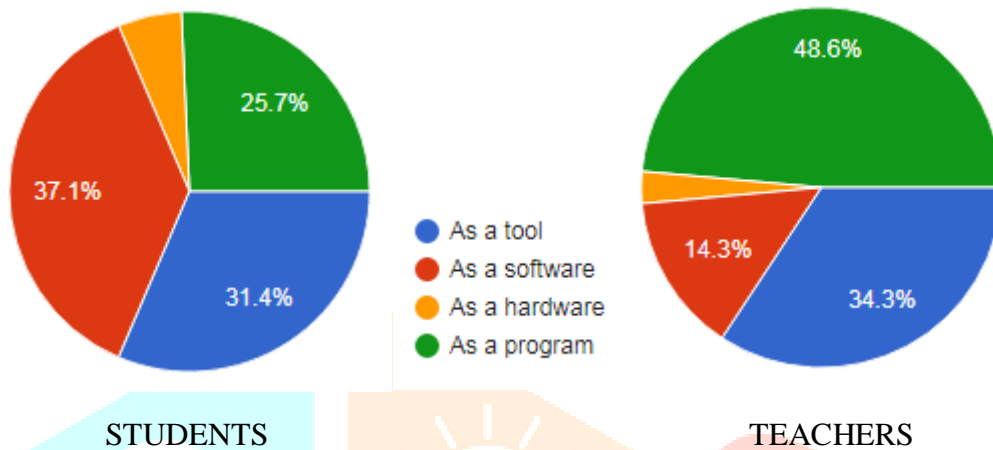
2) **Do you think, AI can change the book reading habits in students?**

STUDENTS   TEACHERS
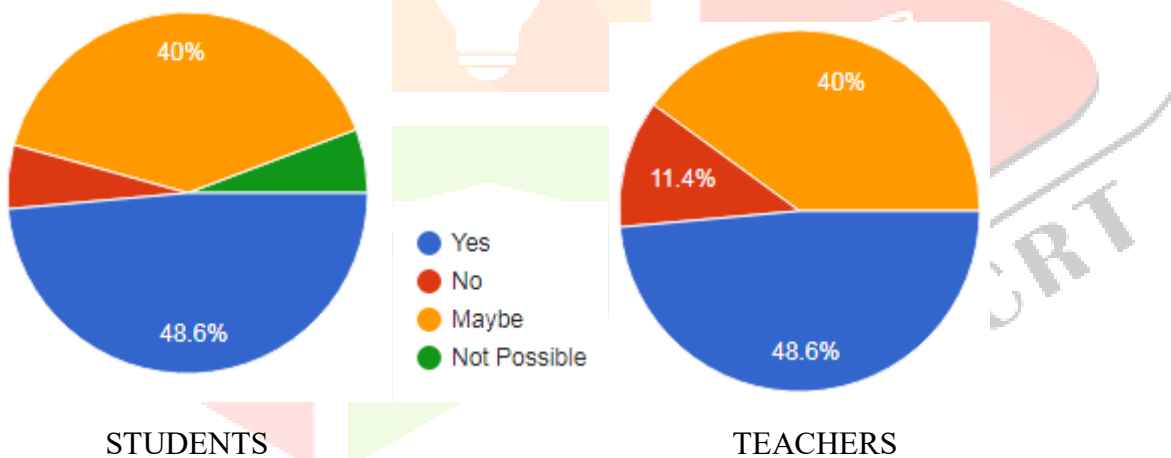
3) **Can AI increase the cognitive abilities of the student?**

STUDENTS   TEACHERS
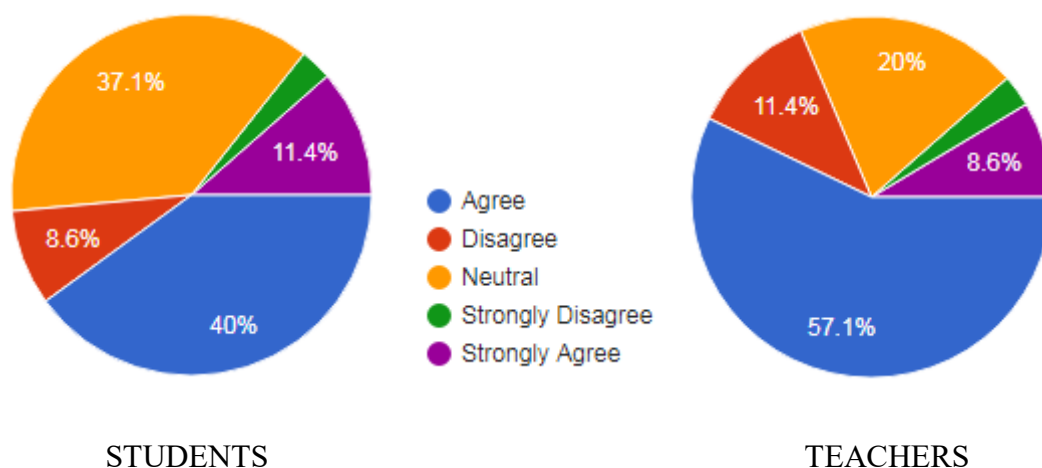
4) **Do you think, AI can enhance the school experience of students with disabilities?**
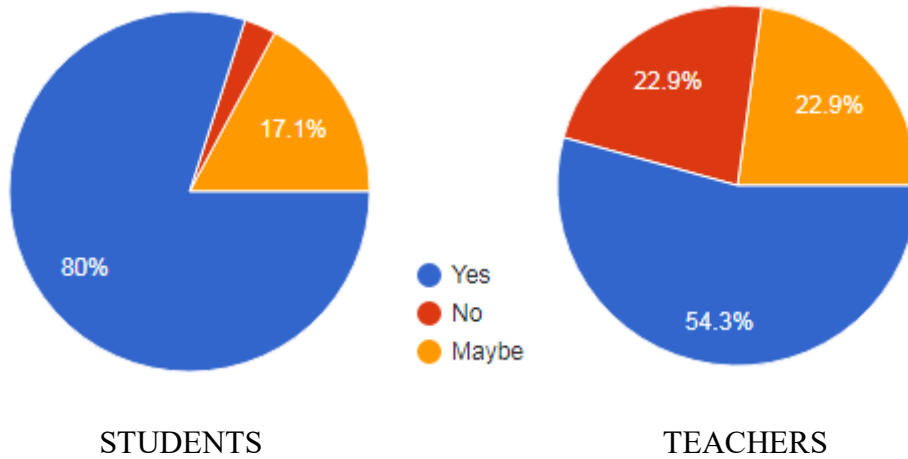
STUDENTS   TEACHERS

5) **What do you think, can AI provide the same motivation and inspiration as an educator does?**
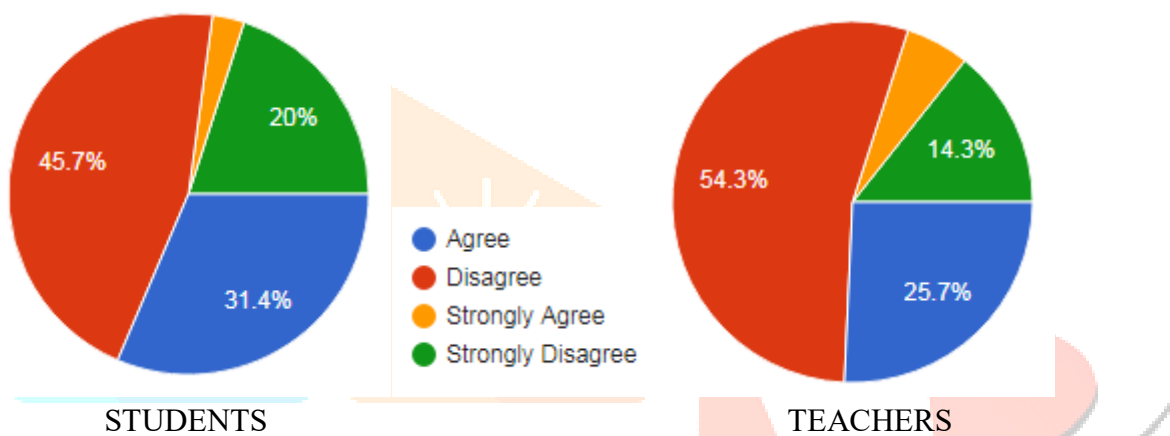
STUDENTS   TEACHERS

6) **Do you think, AI can help the students for higher education?**
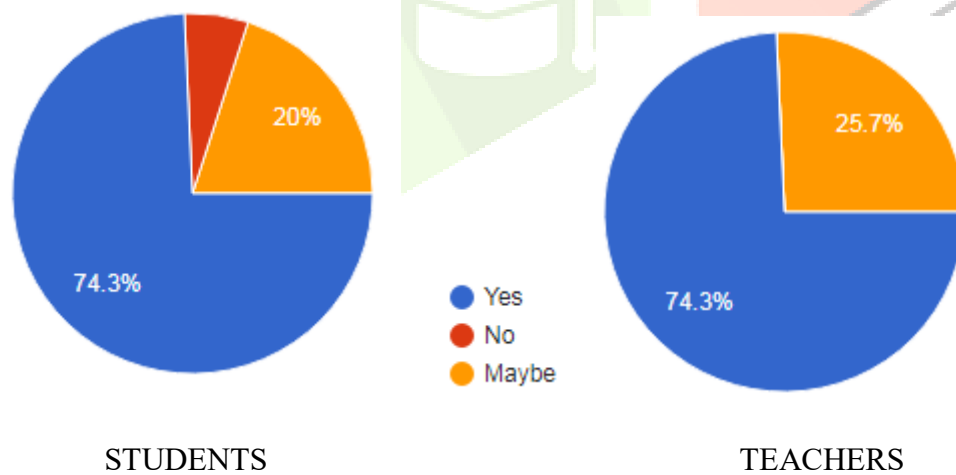
STUDENTS   TEACHERS

7) **Should AI be allowed to teach and guide kindergarten students?**
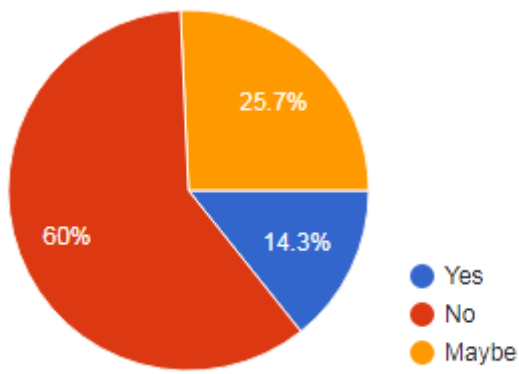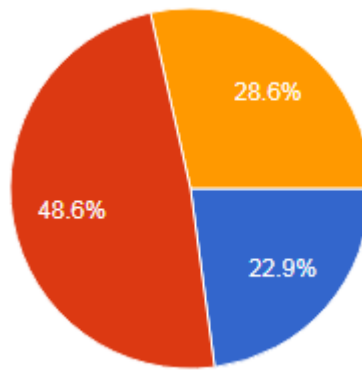
STUDENTS   TEACHERS

8) **With the ongoing innovations, do you think in the near future, AI would be able to adapt to versatile teaching styles?**
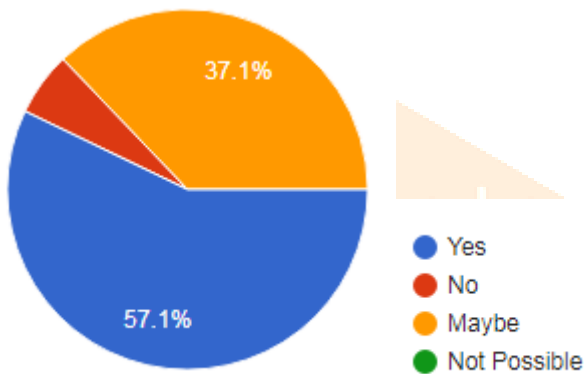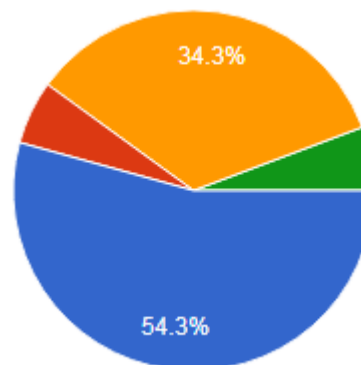
STUDENTS   TEACHERS

9) **In your opinion, how do we safeguard the privacy of students with AI?**
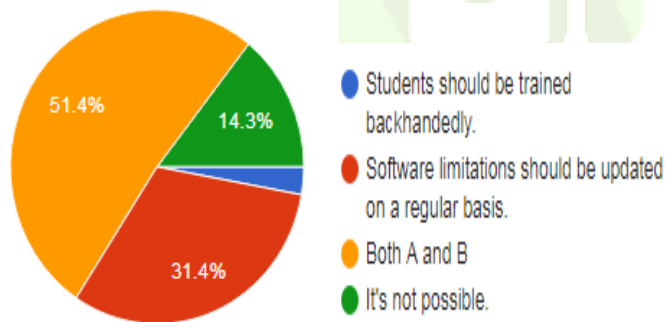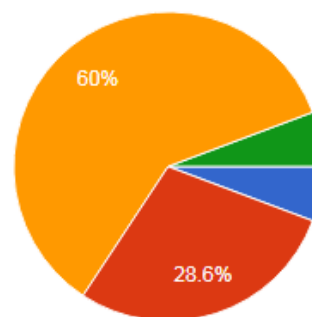
STUDENTS   TEACHERS

10) **Can AI ever help in adaptive learning for students?**
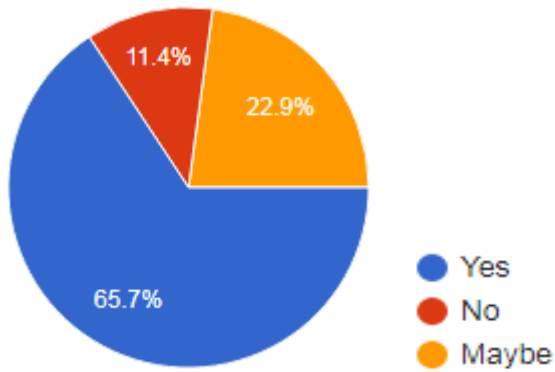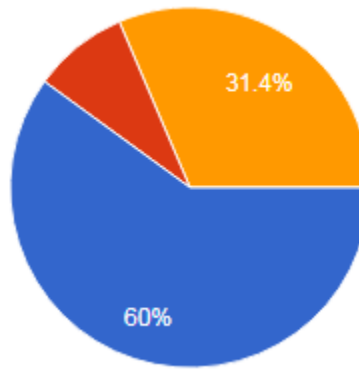
STUDENTS   TEACHERS

11) Will AI be able to develop an emotional intellect with a student as a teacher does?
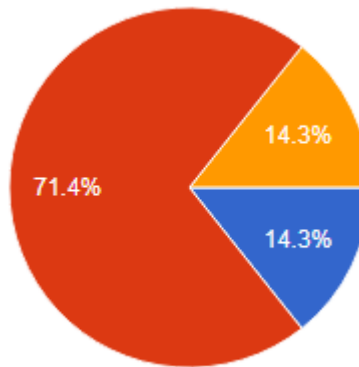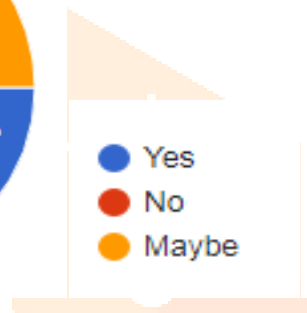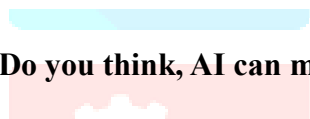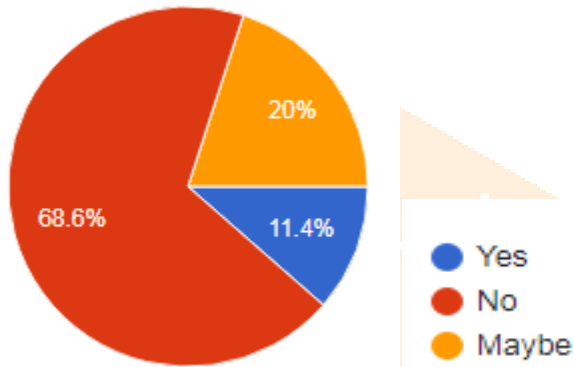
12) Do you think, AI can misuse the personal information of a student?
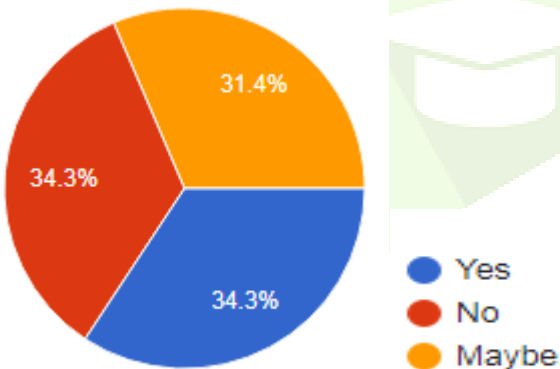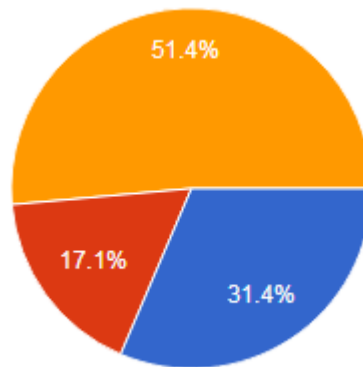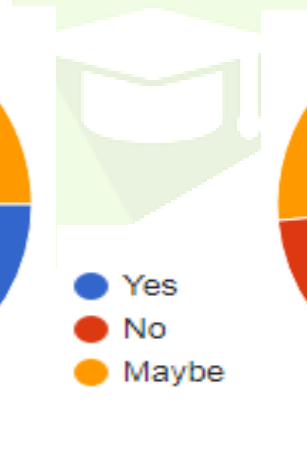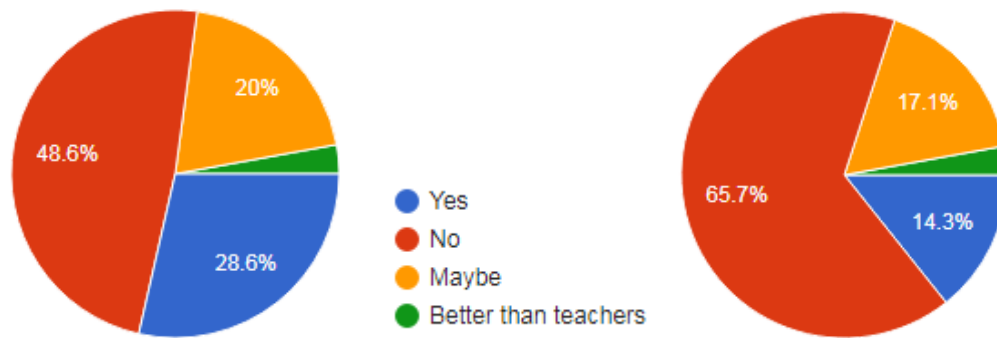

STUDENTS   TEACHERS
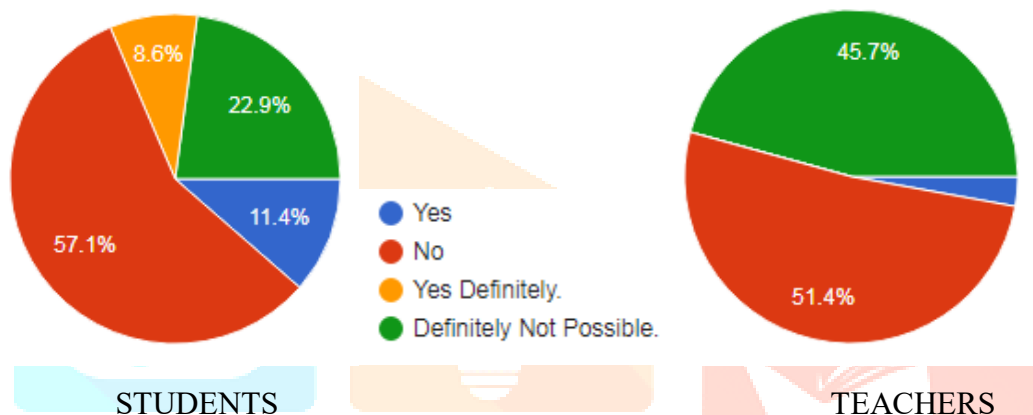
13) Can AI be used for student's assessment?
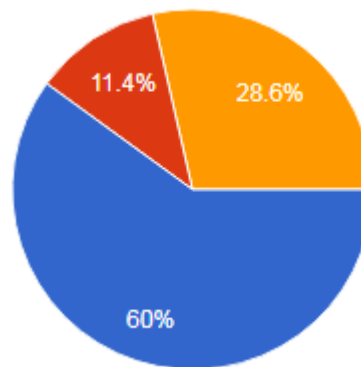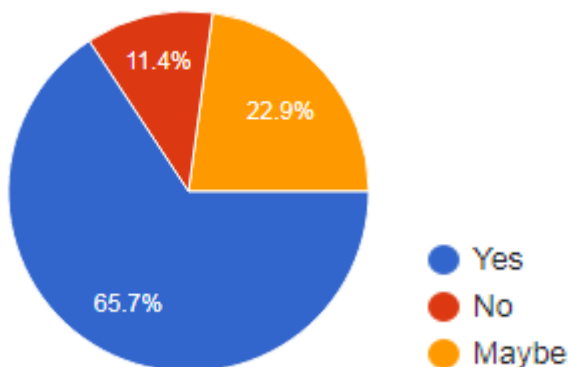
STUDENTS   TEACHERS

14) Do you think, AI can deal with the discipline issues just like a teacher?

15) In light of the above answers, do you think AI can ever replace teachers completely?

STUDENTS   TEACHERS

VI. CONCLUSION

There were quite differences between the opinions of both students and teachers regarding the questions. This clearly showed the difference in the knowledge about the subject and its consequences which could be there. Firstly, more students considered the role of AI as an educator as a software, whereas, teachers preferred as a program. Then, more teachers were optimistic about AI increasing the cognitive abilities of the students, where more of the students preferred to be neutral. Moreover, the students seemed more assured that AI will be helpful in enhancing the school experience of the students with disabilities than the teachers. Furthermore, both students and teachers almost equally agreed and disagreed regarding matching the level of motivation and inspiration as an educator does for AI. Then, students seemed to be equally distributed regarding the issue of misusing the personal information of students between yes, no, and maybe. Whereas, teachers seemed more inclined towards the option of maybe more than yes and no. Additionally, with regards to the discipline issues, students seemed to be more confident about the capabilities of AI to tackle it than the teachers. Finally, there were way more students convinced that AI can replace the teachers completely in the future.

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