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Article reviews

Robots Assist or Replace Teachers in the Classroom

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Abstract

As artificial intelligence and robotics technologies continue to grow exponentially, we will be able to do some amazing things with the help of robots in education. This article will describe the potential of robots in the education system. The use of robots in educating students can be crucial, but it remains uncertain whether they will entirely replace teachers. Therefore, this study aims to see if robots are assistants or replace teachers in the classroom. This study followed a systematic approach to the reviewed literature to compile relevant articles. Robots can be helpful teaching tools in the school, as evidenced by the results and pertinent literature, but it is unlikely that they will ever completely replace teachers. Robots, however, are a flexible solution for the educational system and are appropriate for some forms of assistance.

Keywords *Assist, Classroom, Replace, Robot, School, Teacher*

INTRODUCTION

Given the current level of innovation in education, it is reasonable to assume that robots could replace teachers in the classroom. As a result, automation is gradually becoming more common in schools, with educational software catering to the specific requirements of educators, such as curriculum development, grade evaluation, and content recommendation. The key issue at hand is whether robots will eventually replace teachers, and to address this question, we must consider the teacher's role in the classroom, the values they impart to their students, and how technology can assist us in determining the answer.

Traditional teaching methods make lessons difficult to understand for students because they are formal and boring (Regudon et al., 2022). Placing a robot in a classroom might not seem like a good idea. However, this is something that engineers and scientists have been working on for a while. These innovators first set out to demonstrate that such human-machine interaction was feasible before attempting to develop a long-lasting educational experience.

Teachers have greater access to technology to aid them in their teaching work. With interactive software, they can provide customized and relevant information to their students. However, despite the advancements in technology, the significance of human teachers in the classroom has not diminished. While these interactive apps can assist teachers, they cannot replace a teacher's continuing responsibility to assist students in their growth as learners. This is particularly true given the limitations inherent in these emerging technologies.

Teachers are renowned for building close bonds with their pupils and monitoring their progress. Compared to less skilled robots, they can express themselves much more expressively through posture and gesture. The teacher's job description goes beyond merely imparting knowledge. It continues. A good educator motivates students and provides them with a positive role model. A good teacher will modify their lesson plans to meet the needs of students with different talents and learning preferences. Although it may appear that the advancement of technology has affected the educational system, experts say there is not a great chance that robots

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will replace teachers.

Robots provide an embodiment and capability to add social interaction to the learning context, thus advancing purely software-based learning (Mubin et al., 2013). The study by Edwards and Cheok (2018) argues for a future classroom of autonomous robot teachers, highlighting the minimum skills required of such personalities in terms of personality, instruction, social interaction and influence. Robotics systems' foundation in machine learning and adaptability allows curriculum and materials to be tailored to each student's needs, leading to greater student engagement, retention, and overall learning enjoyment (Alam, 2021).

Children are now spending more time in school learning social-emotional skills. In contrast, robots are only capable of teaching students how to solve mathematical problems or how to read. The abilities mentioned above are necessary for teaching but are insufficient because this type of instruction requires a human touch, which human teachers can only provide. For many years to come, the best teachers will undoubtedly remain a key component of educating and inspiring students. However, technology should be viewed as a tool to maximize the teacher's potential, not as a replacement for the teacher.

LITERATURE REVIEW

Academic research into robot and machine ethics is active and developing, and it stimulates discussion and discourse similar to that of (human) ethics. According to Asimov (1995), the three laws of robotics emphasize the following:

a. **Law 1:** A robot may not intentionally harm people or, through inaction, permit someone to harm people.
b. **Law 2:** A robot must follow human commands unless they violate the first law.
c. **Law 3:** As long as the defence does not conflict with the first two laws, a robot must defend its existence.

On the other hand, teachers struggle to understand how or why robots can be used in the classroom and exhibit a limited understanding of the types of technology robots use (Hrastinski et al., 2019). For instance, the University of Memphis researchers created the intelligent tutoring program AutoTutor to instruct complex critical thinking ideas. Based on predetermined lessons, it offers step-by-step reading comprehension exercises. Much research has been done at Carnegie University on a tutoring program that teaches how the typical student learns. The software tests every approach to solving a problem based on machine learning algorithms and, as a result, automatically generates every possible educational path (Buchert, 2022).

The involvement of robots in the education process becomes an essential issue which raises various predictions. For example, Anthony Seldon, vice-chancellor of the University of Buckingham, predicts that by 2027, less than ten years from now, robots will replace teachers. In contrast, Matthew Longtin, a qualified writer for ProPapers, disagrees. He claimed that since robots lack a soul and cannot inspire students the way people can, technology cannot replace human support and encouragement. These two contradictive statements, in the end, concluded by Sayeed (2020), who stated that robots might be crucial to children's education but will never fully replace teachers.

In the era of computer-assisted instruction, one of the main objectives of learning is to enable students to analyze fundamental knowledge and skills that cannot be mastered by a variety of machines, such as speculative skills, practical skills, and collaborative communication skills, to foster curiosity and to help students develop a sense of lifelong learning, rather than just learning facts off by heart (Zhao & Liu, 2018). This condition was already tested in 2016 when a technology professor in Georgia used an artificial intelligence robot as an online teaching assistant. Only at the end of the semester did he reveal who he really was to the students. The students were astonished and stated they could not distinguish between the robot and a real person (Mehta, 2022).

A similar condition also appeared when Tae-Gyu (2010) stated that robots are expected to replace some English-speaking teachers in South Korea during the second decade, which caught everyone's attention. The same article stated that by 2015, robots should be able to assist teachers in English language classes, according to Shin-Hwan (2010), an economist at the Hyundai Research Institute. By 2018, they ought to be able to interact with students and learn independently. He asserts that robots will also develop from their current state (like an online learning environment) to become autonomous teachers who do not need human supervision (Tae-gyu, 2010).

However, amid robots' rapid development and involvement in the present education process, Baron (2010) clarifies that these robots are not meant to replace human teachers. However, some scientists predict that soon, robots will assist teachers. Hiroshi Kobayashi, the designer of the Japanese robot Saya, remarked that the robot lacks intelligence and is incapable of reading or writing. He emphasized that the robot is simply a tool and lacks any distinctive personality. According to Candy Xiong, a teacher with early childhood education training who now serves as a trainer for Keeko Robot Xiamen Technology, education is no longer a one-way street where the teacher teaches, and the students merely absorb what is being taught (KeeKo, 2018). A study by Ganira (2022) also emphasizes how teachers should be provided with tools and resources for incorporating STEAM activities, considering the nature of the practices used and the characteristics that may help or hinder learning. This statement is evidenced by the creation of Kaspar, a robot which can be a secure and reliable learning tool for kids with autism. It enables them to achieve particular educational or therapeutic goals (like making direct eye contact or taking turns) in a fun play context while also learning social interaction and communication skills. A group of 54 autism spectrum disorder (ASD) professionals were convinced that Kaspar could be helpful in interventions for a wide range of therapy purposes and education for children with ASD.

If one of the students is extremely anxious about the assignment and exhibits many typical physical signs of anxiety, such as sweaty palms, shallow breathing, a rapid heartbeat, and an upset stomach. However, these signs could also be present in many other physical conditions that need medical attention. Here, we assume that the robot, like a human teacher, may not always be able to identify medical conditions. As a result, the robot's hard coding dictates that it must take action to prevent hurting this student due to her symptoms. The robot's first move would probably be to remove the student from the situation, which would lessen his symptoms and anxiety but prevent him from finishing the assigned task. Whether it can recognize this as anxiety or not, the robot must take action to prevent any harm from happening to the human. If the human is left in a high-anxiety situation, the robot will likely be less effective, as in the definition of damage above. This demonstrates a weakness the robot teacher has over the human instructor: the capacity to balance risk and sacrifice, as well as a lack of planning (Robertson, 2022).

Due to the STEM (Science, Technology, Engineering, and Mathematics) requirements for studying educational robotics, many different learning opportunities are available. Robotics is always interdisciplinary in ways that students can understand and use. Students acquire knowledge and understanding by making connections between ideas from various STEM fields. Students must collaborate, think computationally, solve problems, and innovate in robotics-related activities—all essential skills for 21st-century students and, ultimately, 21st-century professionals. The scientific method, observation, experimentation, data collection, and analysis are basic scientific methods and practices that can be learned in educational robotics. Applied physics, mechanical concepts, systems thinking, and artificial intelligence can all be studied through this method. The many ways in which technology influences modern life are highlighted in Educational Robotics. Students create, program, and manipulate their technological models to apply fresh concepts that enhance current workflows. Robots are concrete examples of how technology is applied to fulfil users' needs as well as societal needs. Educational robotics is an excellent way to give math to students a deeper

meaning. Robots act as the "hook" that draws students in and helps them become immersed in the world of mathematics by having them use their knowledge in practical situations. Students can then discover the importance of mathematics in their daily lives (VEX, 2023). Technological advancements can inspire people to lead better lives and follow social norms (Sudirman et al., 2022).

RESEARCH METHOD

Identification of the problem

Since robots have extraordinary computational thinking capabilities and the capacity to react to unforeseen stimuli, there is much discussion about the field of robotics and its impact on education and its potential to replace teachers. As a result, students can benefit from their own learning experiences by utilizing robot empathy.

There are some things that a human teacher can do better than a robot teacher, and there are some things that a robot teacher can do better than a human teacher when comparing the use of robot teachers versus human teachers. Certain tasks can be accomplished by a robot teacher more quickly and effectively than by a human teacher, who may take longer and make mistakes. An actual human connection, socialization, human interaction, emotions, creativity, inspiration, and more are all brought by a human teacher.

Purpose of the Research

Machine Learning (ML) and Artificial Intelligence (AI) technologies are already powering the integration services of robots in learning environments. Introducing robotics into education responsibly and thoughtfully can provide much-needed support for students and teachers. The uses for classroom robots are numerous. Some serve as study materials for students to practice programming, while others serve as teaching aids, learning partners, or autonomous teachers who deliver lessons more or less as a whole. Therefore, this research aims to determine whether robots can assist or even replace teachers in the classroom while students are learning.

Research Objectives

The objectives of this research are: to see if robots assist teachers in the classroom; to see if robots can replace teachers; to see which robots are suitable for school; to see what the benefits of robots are for students, to see if the robots can fulfil the learning objectives; to see the efficiency of robots used in classrooms.

Research Design

This study followed a systematic approach to the reviewed literature to compile relevant articles. Research conducted within the last 15 years was considered to ensure that we would only review relatively recent research on the topic. The sources selected for this study were the data reported on the website and research reports by different authors. In addition, an attempt was made to brainstorm research in a series of analyzes of previous literature that resulted in the emergence of themes of robots in education. Then we consolidated our findings under those themes.

FINDINGS AND DISCUSSION

Findings

Robotics in the classroom can be used in various ways that can be customized to meet the needs of students of various ages. The results achieved by the most common educational robots currently used in classrooms are impressive. Here are some of the most popular educational robots

in use right now.

NAO

One of the most well-liked educational robots is NAO. Two cameras, four microphones, and numerous other sensors on this 58 cm tall robot enable it to interact with a classroom like a human would. NAO has been utilized in classrooms from elementary schools to universities and can converse with students, listen to discussions, and teach any subject.

Figure 1. NAO Robot

Aldebaran's first robot was named NAO. Famous throughout the globe, NAO is a superb programming tool that has, in particular, become a norm in education and research. The NAO robot can move and adjust to its surroundings thanks to its 25-degree motion characteristics. It uses sonar, an inertial unit, and seven tactile sensors on its head, hands, and feet to sense its surroundings and navigate in space. In order to communicate with people, it has a speaker and four directional microphones. English, French, Spanish, German, Italian, Arabic, Dutch, Portuguese, Czech, Finnish, Russian, Swedish, and Turkish are among the 20 languages that support speech recognition and dialogue. It has two 2D cameras that can identify shapes, objects, and even people and an open platform that can be fully programmed.

NAO can establish an emotional bond with students, teachers, and researchers because of its pleasing appearance, average size, and human-like behaviour. As a result of its popularity in the global education market, NAO is facilitating creative classroom teaching methods. NAO is a flexible and high-capacity robot that fulfils the demands of teachers and researchers. It is an advanced technology that can be used for in-depth research in areas such as human-machine interaction, cognitive computing, and autonomous navigation.

They are visually appealing and user-friendly interface facilitates content creation and enables small-group or one-on-one personalized learning activities. Robotic humans use project-based learning (PBL) techniques to present interesting pedagogical topics. They help pupils develop the critical thinking and problem-solving skills required to thrive in a knowledge-based, highly technological society. NAO enhances self-motivation in learning STEAM topics and fosters the growth of creativity with customized and adaptable curricula. Additionally, NAO is adept at developing empathy with kids and inspiring and guiding them as they engage in intellectual and physical activities as well as social and emotional skill development. Humanoid robots have already been used to promote IEP (individualized education program) education for students with disabilities like autism, emotional and behavioural disorders and to implement successful inclusive

practices. Children who use emotional robots have less shyness, reluctance, mistrust, and frustration, enhancing their social skills and self-esteem. NAOs are effective tools for promoting special education inclusion in general education classes by cultivating favourable attitudes and perceptions (NAO, 2022).

mBot

The Madeblock mBot is an elementary robot that introduces kids to robotics, programming, and electronics. It is ideal for early robotics education. It is simple to put together and operate, making it suitable for complete beginners as well as older students who want to build more advanced robots.

Figure 2. mBot Robot

More than 100 different types of electronic modules can be connected to the mBot's four expansion ports. On the creative platform, kids can use more than 500 parts and a variety of add-on packs to construct a wide range of imaginative shapes. They will lay the groundwork for understanding robots while learning about the fundamentals of mechanics and electronics. Because mBot is compatible with additional building blocks, gameplay can develop over time. The mBot Beginner A STEM coding robot called the Coding Robot Kit for Kids makes learning how to program robots easy and enjoyable. Kids can construct a robot from scratch and enjoy the satisfaction of hands-on creation with just a screwdriver and step-by-step instructions. Along the way, they will gain knowledge of various robotic devices and electronic components, master the fundamentals of block-based programming, and hone their design and logical reasoning abilities. From the very beginning, playing with others helps kids learn more. More than 4.5 million kids worldwide have been delighted by mBot, with its adorable big eyes and the cute smiley face. mBot is a fantastic educational tool for teachers to use in STEAM lessons, as well as a great companion for children learning to build and code. Additionally, mBot forces kids to use both their hands and their brains, encouraging them to practice their interdisciplinary skills while allowing them to enjoy the limitless joy of creation (MBOT, 2023).

LEGO

Brainstorms EV3 is a more sophisticated educational robot made by LEGO intended to be used by children over 10. The robot has sensors and more than 500 LEGO technical parts, which enable it to move, shoot, crawl, and perform various other tasks.

Figure 3. LEGO Robot

"Hybrid learning" in the context of LEGO Education refers to the various methods teachers use to present their curriculum in various contexts. Giving teachers flexibility is a key component of hybrid learning with LEGO education. They provide assistance and solutions, whether working with students at home or instructing in various settings throughout the week. Comprehensive lesson plans are available in a variety of lengths and levels of difficulty. Lessons closely related to the curriculum offer a variety of learning opportunities that are directly related to students' observations and questions from the real world, boosting their self-esteem and preparing them for life after school. Hybrid lessons in LEGO Education offer the adaptability to fit any learning setup, whether modifying classrooms at school or providing hands-on experiences at home. Create and program any walking, talking, and thinking robot using the Intelligent Ev3 Brick, Three Servo Motors, and Color, Touch, and IR Sensors. SPIK3R is a LEGO Mindstorms building toy that measures more than 16" tall, 14" long, and 15" wide (LEGO, 2023).

KeeKo

The Chinese kindergarteners smile as they attempt to solve the puzzles provided to them by their new assistant, a short, round teacher who is wearing a screen over her face. In some kindergartens, the autonomous robot Keeko has gained popularity. Standing just under 60 centimetres (two feet) tall, Keeko can tell stories and provide challenges for kids with difficulty using logic. The tubular, white, armless robot has a round body. It mounts on tiny wheels and has a front-facing camera that enables users to record video logs, as well as built-in cameras that serve as navigational sensors.

Figure 4. KeeKo Robot

Robots are being developed in China for many different purposes, such as grocery delivery, senior care, legal counsel, and now, as Keeko's creators hope, joining the ranks of educators. Children at the Institute of Multicultural Education in Yiswind, on the outskirts of Beijing, are tasked with guiding a prince through a desert by positioning square mats representing the robot's path. This activity is a combination of storytelling and problem-solving. The device responds joyfully, with its face flashing heart-shaped eyes, whenever they select the right response. To expand into Greater China and Southeast Asia, Keeko robots have already been introduced in more than 600 kindergartens nationwide. Beijing has invested resources and labour to develop artificial intelligence as part of its "Made in China 2025" initiative. Last year, a Chinese company unveiled the nation's first human-like robot to carry on basic conversations and display facial expressions. KeeKo robots are part of a major effort to make technologies powered by artificial intelligence a world leader (KeeKo, 2018).

Tega

Tega is a new robot platform that supports lengthy interactions with kids and has uses in vocabulary and story-based early literacy education. Tega is a robot that tells stories and talks to children; its purpose is to improve their language and assert language skills. Storytelling is essential to child development, so it is exciting if a robot can encourage the process.

Figure 5. Tega Robot

The Emotion SDK for Android from Affectiva was integrated into Tega, a new robot platform designed to support educational interactions with children, by researchers in the Personal Robots Group at the MIT Media Lab. The researchers created a reward signal from the affective content of the children's facial expressions, which they then fed into an affective reinforcement learning algorithm to control Tega's behaviour. This allowed Tega to recognize the reward signal and respond accordingly. The robot Tega was developed to promote ongoing interactions with young children. The robot can move in five different directions using smartphone technology for computation, behaviour control, sensor processing, and motor control: head up/down, body tilt left/right, bend forward/backwards, reach up/down, and body rotate left/right. Graphical facial expressions are also shown. The robot has an external camera phone that can take high-definition pictures with a broader field of view to enhance perception. The battery-efficient system can operate continuously for up to six hours before needing to be recharged. They have a lead screw design between the torso and head, allowing them to expand quickly and contract. They are made for powerful and dependable actuator movement. As a result, the robot can produce consistent, expressive behaviour for longer periods. These robots have made significant educational

advancements, developing kids' social skills, personalizing lessons through one-on-one interactions, and filling in for teachers' overburdened workloads. (Tega, 2022).

VEX

The field of robotics exists right now as well as in the future. By exposing students to programming, sensors, and automation, educators can help them develop the computational critical thinking abilities necessary for both the workplace and daily life in the twenty-first century.

Figure 6. VEX Robot

Beyond science and engineering basics, VEX Robotics solutions encourage teamwork, leadership, creativity, and group problem-solving. Because of this, VEX is committed to making implementation simple, leading the STEM field in robotics education advancement, and supporting you every step of the way. Using educational robotics to give students a real choice in the classroom can boost their motivation and engagement, help them to build on their strengths, and help them meet their learning needs. Students who use educational robotics report feeling more connected, competent, and autonomous. Students feel independent when they comprehend the assignment, especially if they believe it aligns with their values, interests, and objectives. Students also feel competent when they think they know what to do to succeed and feel capable of taking on challenges. They experience a sense of connection through interpersonal closeness or group membership. VEX IQ and VEX V5 use the same block and text formatting in VEXcode. Students never have to learn a new block, code, or toolbar interface as they progress through elementary, middle, and high school. Students can focus on creating with technology rather than figuring out a new layout. VEX Robotics created STEM Labs as an additional educational resource. It aimed to give teachers access to cost-free, easily understandable STEM lesson plans that met academic standards. Each STEM lab provides supervised explorations and practical instruction to encourage collaboration and teamwork (VEX, 2023).

Kaspar

Aiming to make social interaction more focused and comfortable for the child, Kaspar (Kinesics and Synchronization in Personal Assistant Robotics) is an expressive robot that offers a more predictable and, at the first repetitive form of communication.

Figure 7. Kaspar Robot

Kaspar is a humanoid robot that is kid-sized and created to be a social companion for kids with autism and other communication challenges. Kaspar is a small, 3-year-old humanoid robot that resembles a child. The robot's face is a silicone mask of its colour that lacks the characteristics that would typically allow for determining the age, gender, level of emotional intensity, and other things. On the one hand, this deliberate definition allows the child's imagination to run wild, allowing him to imagine Kaspar as a playmate or someone he can feel at ease around. Kaspar assists teachers and parents in assisting children with autism to overcome their challenges with socializing and communication by interacting and acting in a childlike manner. The Adaptive Systems Research Group at the University of Hertfordshire, led by Professor Kerstin Dautenhahn of Artificial Intelligence, has researched adaptive systems for over ten years. Following field trials in homes and classrooms, researchers are working to make Kaspar available to every child who requires it. Robots can serve as a safe and reliable learning tool to promote social interaction and communication in autistic children, according to research with Kaspar. The robot's purpose is to teach children with autism a set of abilities that most of us already have, more or less without the need for specialized education: understanding others' emotions and responding appropriately, expressing our own emotions, and participating in group activities while we are able. Everyone participates in turns, imitates others, and works together. Using robotic playmates for therapeutic purposes was inspired by a well-researched finding in the literature about autistic children. Early intervention can assist them in developing social and cognitive skills that they would not otherwise be able to (Kaspar, 2023).

Discussion

This review paper has presented an overview of important and recent works in robotics in education. Teachers can now more than ever rely on technology to help them with their educational work. This interactive software enables them to provide relevant and personalized information to their students. However, the importance of human teachers in the classroom has not changed. No app can replace a teacher in the task of fostering student development and learning. This is especially true given the limitations of these emerging technologies.

Despite being accurate and insightful, automated grading systems lack the flexible judgment of human teachers. A qualified teacher is in a better position than anyone to understand the difficulties students encounter on both an intellectual and emotional level. Robots might not be aware that distractions are more common among students or that some students have trouble focusing because they cannot rely on their peers. These factors necessitate that the teacher be able

to edit and comment on grades that are automatically assigned manually. If the grade is not stated, robots might miss the emotional nuance of this exercise, which is important for motivating and directing students. No matter how sophisticated they are, these robotic systems will never be able to reason or learn in the same way that people do.

In contrast to machine learning-based models that process massive amounts of data without clear reasoning, students rely on entirely explicable thought patterns. In this regard, teachers should show students how they understand and analyze a particular problem. They are also more willing to acknowledge their inexperience and educate students about ambiguous or uncertain knowledge. Unlike a robot, the teacher can empathize with and relate to various viewpoints. Teachers are known for developing strong relationships with their students to ensure their progress. Because they can communicate through posture and gesture, they can express themselves much more effectively than a less flexible robot. Students respond more strongly to animated body language (Buchert, 2022).

Additionally, the job calls for great sensitivity to political and cultural issues. Education teaches fundamental moral principles that support the survival of communities and societies. Robots might be unable to convey those intentions with the commitment and wisdom required to raise rational beings. As a result, it may spark a variety of controversies. However, the pairing of these educational approaches with the devoted work habits of teachers still has great potential. Education can be made as convenient and kind as possible for both teachers and students here.

CONCLUSIONS

Robots cannot completely replace teachers, but they can be their assistants. Robots can help school students develop and improve their skills and help them overcome the difficulties they face during education. Robots are primarily used as teaching assistants because they lack the independence necessary to function as fully independent teachers; everything they can do is based on pre-programmed tasks. It is important to note that some teachers are not entirely opposed to robots helping them with daily tasks like grading, teaching, copying worksheets, and language translation. Teachers can benefit from robot assistance. When a robot performs some of these duties, the human instructor can concentrate on other crucial aspects of the day, which is advantageous for both the student and the teacher.

However, combining these educational solutions with the dedicated work ethic of teachers still looks very promising. Here, education can be made convenient and humane for teachers and students. Robots and teachers do not necessarily have to be seen as one or the other. As mentioned, teachers frequently use and design robots to help students learn. Another justification for why robots cannot replace teachers is that they must coexist. Although not all students receive an equal education, robots can aid teachers in closing the gap. In order to help students and provide them with the best learning experience, imagine technology and human teachers collaborating instead of worrying about robots taking over the world.

In other words, the following significant change will likely occur within the next three decades or so. Although there is no statistically significant weak correlation between robot teacher replacement and some strong empirical correlations, there is some association between robot teacher assistance robot (Edwards & Cheok, 2018; Buchert, 2022; Mubin et al., 2013; Zhao & Liu, 2018). The author also wants to present a discussion with students regarding replacing teachers with robots, where the students' answer was: "What kind of students are we? We block even the robot."

Ultimately, it is important to remember that robots are created to assist humans, not the other way around. Thus, teaching involves showing love, dedication, and compassion. Currently, robots are not capable of providing these qualities to students. However, in the future, robots

equipped with artificial intelligence may be able to support and aid children in their development, much like human teachers.

LIMITATION & FURTHER RESEARCH

The discovery of comparatively unexplored directions and challenges in the field of robotics in education that are under investigation is one of the main limitations of our review. The complete reliance on previously published research and the accessibility of these studies in the area of robots in education are additional limitations of a literature review.

As a result, similar research on measuring the experience of robots replacing or assisting teachers in the classroom needs to be done in the future. Our overview should serve as a starting point for future research in the area of human-robot interaction as well as for administrators in educational institutions who wish to comprehend the broader effects of adopting robot education. Finally, this review will try to pinpoint new research directions for educational robotics.

Recommendation

After reviewing the literature and understanding the involvement of robots in education, this study has several recommendations that might be useful to be implemented by scholars and improve the current learning process. Firstly, robots can take over simple tasks in the classroom and save the teacher time and energy. Teachers can use robots to integrate better students who face physical and mental health difficulties and recognize potential disabilities of students in their classrooms before they start teaching. Furthermore, the involvement of robots in the learning process can help identify weaker students, give them the attention they may be looking for, and help teachers ensure that students learn better with the resources available. In the end, the choice of robots that can be used as assistants in the classroom should be taken care of by the age group of the students and their field of study.

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