# ROBOTICS IN SCHOOL EDUCATION

S. SURESH, B.Sc., M.A., M.Ed., M.Phil. (Education)
TGT (MATHEMATICS)
Voc Ghss, Kottucherry, Karaikal

## INTRODUCTION:

A ROBOT is a type of automated machine that can execute specific tasks with little or no human intervention with speed and precision. It is such a machine that works automatically and can do some tasks that human can do.

The field of ROBOTICS deals with robot design, engineering and operation, has advanced remarkable development in the last fifty years.

The word, "ROBOTICS" can be defined in many ways. The basic definition being a branch of engineering that involves designing, constructing, operating and using of robots in doing work traditionally done by humans. An automatically operated machine, capable of sensing the environment, carrying out computations to make decisions, performing tasks in the real world. This definition of robotics has evolved and expanded over the years with the continuous advancement in technology, artificial intelligence, science and engineering. It has made its presence known in almost all fields and professions from industry to presently educational institution.

*Abstract*: **The COVID-19 pandemic reshaped the education sector, with school closures and online classes leading to the world's largest remote learning experience. This experience, although unplanned, opened our eyes to the benefits of science and technology and digital tools for assisting teachers. Government goes in leading to even all village schools with smart boards, internet facilities, Online Open Courses, etc. Now the metropolitan cities go further to bring a robot into the classroom. In this paper we will go deep analyzing the existence of robot replacing a teacher in face to face learning.**

*Keywords:* **Robot, Teacher, Machine, Teaching-Learning Process, Inter-action**

**EDUCATIONAL ROBOTICS:** Enabling the students to learn about Robotics and Inter-active programming with its complexity adapted to the various age groups of students. It benefits are numerous, academically, as well as in social, personal, emotional learning. In the present fast changing the ever-expanding world of technology, Robotics is considered an important skill and is being included in school curriculums to prepare students for the life after school and for the competitive future.

## THE BENEFITS OF EDUCATIONAL ROBOTICS:

1. Students are motivated to think of a problem and solve it in the most convenient way possible with the help of robotics.
2. Creative thinking, Imagination, Analytical skills, Critical thinking and all other skills are considered as important for the future and robotics help the students in all these areas.
3. Students develop skills through experiments as well as trial and error method with educational robotics. This process also leads to the desire to innovate think autonomously and finally to undertake their own independent projects, decisions and it leads cognitive success.
4. The regular practice of numerical calculations, logical programming patterns in educational robotics leads them to the analytical, logical, computational skills
5. By emphasizing practical learning compared to theoretical rote-learning, Robotics helps the students to develop the interest in the subjects Science, Technology, Engineering and Mathematics, which they may find difficult to comprehend otherwise causing them to lose interest.
6. Students develop new abilities and grow in confidence by solving more and more complex tasks through Robotics.
7. Robot enhances engagement, are adaptable, encourages creativity, teaches soft skills and it can nurture struggling students, it can be programmed in support individual needs.

## THE ROLE OF ROBOTICS AS A TEACHER:

Learning about the components of robotics, how it works, what are the signals and sensors, how it can be developed in many fields are totally different from the teaching done by the robotics. Here Robotics takes the role of teacher and it deals with the students as teacher. Certainly, they are not same. The usage of robotics in industry, factories, hotels, house hold works, robotics as a saver in fire and natural calamities are happily cordially welcomed by all.

But there is hesitation in accepting the robotics as a teacher because of many questions and doubts raised in the minds of the people. The robot teachers are programmed for their jobs and they will obey. They can teach anywhere without getting stressed, tired and moving somewhere for a higher-paid job. They can teach children technological skills. The robot teachers are used as classroom assistants in elementary schools.

A robotics teacher works with students in a class room setting, providing instruction and hand-on experiences with robots. Planning, teaching lessons, helping the students in laboratories are some duties of robotics teacher. In addition to improving computational thinking and critical thinking in education, robots are designed to develop other cognitive skills in children and

adults. Learning from mistakes, understanding those mistakes are not conclusive and it always give opportunities to come to new conclusions.

As the child's education does not mean only concepts and book facts, it comprises the feelings, articulations, loving nurture, psychological situational move towards the child's mind, thinking, cognition, we are in position to question our mind that *CAN MACHINE REPLACE HUMAN IN THE PROCESS OF TEACHING?*

## DE-MERITS OF ROBOTICS:

➢ Most robots require charging to function smoothly, which may lead to spending on electricity in a huge quantity.
➢ As robot teachers do not have feelings, they will not be able to help you if you are going through a rough emotional period.
➢ To enable the use of robot software and hardware, classrooms must be equipped with high-quality infrastructure for the use of electricity and internet connections.
➢ Robot teachers will not be able to develop creative or innovative ideas to help students understand a particular concept, neither can they provide students with critical feedback.
➢ They will not be able to determine whether the concerns of students are due to their personal issues or due to their class performance and therefore will not be able to encourage them regarding their career development.

## HAZARDS:

There are seven sources of hazards that are associated with human interaction with robots and machines: human errors, control errors, mechanical failures, environmental sources, unauthorized access, power systems and improper installation. Beyond that exposure to new risks such as electromagnetic fields, lasers etc. Accidents that can result from lack of understanding, knowledge or control of robotic processes.

## ARE ROBOTS A DANGER TO SOCIETY?

Less adaptability and versatility in workforce, Loss of human jobs, leading to more environmental pollution, maintenance and upfront investments are the factors which have to be discussed on employing the robot. Today's artificial intelligence are still relatively simple and does not pose much of a threat in destroying the human race.

## ADVANTAGES OF ROBOTS IN THE WORK PLACE:

• The first and foremost advantage of having robots is cost. As the cost of robots is decreasing robots are cheaper than humans.
• Comparison of human abilities with robot capabilities shows that robots are growing quickly, more active and don't get tired like humans
• Robots have smaller and versatile moving parts which help them in performing tasks with more accuracy than humans.
• Robots can work anywhere in any environmental condition.

## ADVANTAGES OF ROBOTICS PERFORMING TEACHING:

✓ The memory level is high. So when students ask any question it can give answer out of its memory.
✓ As it is tireless, it can work more and also for long time.
✓ The robot acted as a tutor, giving students the individual attention, they needed to learn a new language at their own pace.
✓ Relying on robots to fulfill basic roles saves schools from scouring a limited talent pool for more teachers and further stretching their financial budgets.
✓ Robots are better at guiding lessons that are structured, require short responses and center on repetition. That means subjects like Mathematics, Science and Language are easier for them.
✓ Educational robots help children develop computational skill which is one of the basic cognitive skills of Mathematics.
✓ Since robots have a futuristic essence, it builds curiosity among kids, therefore encouraging more concentration, logical thinking and problem-solving attitude.
✓ With the help of programmable robotics software, educators can conduct collaborative activities than can facilitate leadership skills, socialization and a teamwork mindset in students.
✓ The use of educational robots in the teaching-learning process for children will allow for better knowledge and interpretation of their surroundings—the world we currently live in.
✓ Robots can be used to help with repetitive tasks. Repetitive tasks which often be boring and time consuming for humans. By delegating these types of mundane chores to robots, teachers can focus more of their time and attention on educating their students.

## DISADVANTAGES OF ROBOTICS PERFORMING TEACHING:

✦ Automation affect on unemployment is one of society's biggest concern as technology develops further
✦ Robots require programming, which means all their behavior has to be pre-determined. They cannot handle unexpected situations.
✦ Critical thinking is an important problem-solving skill that aids humans facing unexpected challenges, as well as in making decisions among many choices.

- Robots cannot perform the nuances of empathetic interaction as well as humans.
- Malware and other cyber attacks on robots can threaten the safety of students.
- Robots have an inevitable impact on the environment. They can cause pollution or contribute to climate change. It can result in harmful damage.
- Teaching the students does not mean just transforming the knowledge. It acquires psychological approach to the students keeping in mind that their background, poverty, family circumstances, etc
- Robot teacher cannot observe individual case study keeping keen interest to boost slow learners.

## COMPARATIVE STUDY: HUMAN TEACHER AND ROBOT TEACHER

- Apparel, Good handwriting, rise and fall of the tone according to the situation, peculiar style of human teacher cannot be performed by the robot-teacher
- When dealing with some tough and abstract subject, as human teacher, robot teacher changes their style of teaching which is the needy and important one.
- Perhaps attractive in the earlier stage, but in the long run students may get bored and aversive for the teaching by robot-teacher.
- Human teacher by seeing the student's eyes and face, can understand whether the students understand the concept or not
- The role and experience of a human teacher in content creation is so huge which a robot cannot replicate.
- A robot teacher cannot differentiate between who is really listening and who is not.
- A robot teacher cannot make emotional connection with the students.
- A human teacher provides real life anecdotes to enhance the learning based on actual experience which a robot teacher cannot.
- A human teacher is a mentor but not a robot teacher.
- Discipline maintenance in the class-room can be done only by human teacher.

## ETHICAL CONCERNS:

The main ethical concerns associated with robot teachers are identified as privacy- attachment-deception-loss of human contact-control and accountability.

## ANALYTICAL REPORT:

Teachers are lifelong learners who continue to learn and grow throughout their careers. They are constantly adapting to new situations and the needs of their students.

The four primary ethical considerations that should be taken into account while deploying social robotics technologies in educational settings—Language and accent as barriers in pedagogy; effect of malfunctioning; trust and deception; ecological viability of innovation. Artificial Intelligence cannot provide the same level of support that teachers can. In addition, teachers are passionate about education and helping the students learn.

Educational robots are used to allow the students to pick up skills in a range of STEM disciplines. Technology is certainly changing the way students learn, but it cannot be termed as a replacement for teachers. High quality teachers create a classroom culture that motivates students and leads them on the path of success. Technology cannot inspire, help them through their struggles, help them fight back and stand up.

Teaching is a one-on-one and many-to-one relationship that works in many unique ways. Not only does a teacher impart worldly knowledge to the students, but they also learn from them. Teachers and students form a symbiotic and synergistic ecosystem that helps in the mutual enhancement of knowledge.

Further, what makes humanized teaching so special, is the fact that teaching happens outside the classrooms as well, it happens throughout life, and that too in various forms, such as visual learning, learning by listening, learning by doing, life experiences etc. Also, learning varies from one person to another depending on their perceptions, abilities and preferences.

**TEACHING  LEARNING PROCESS**
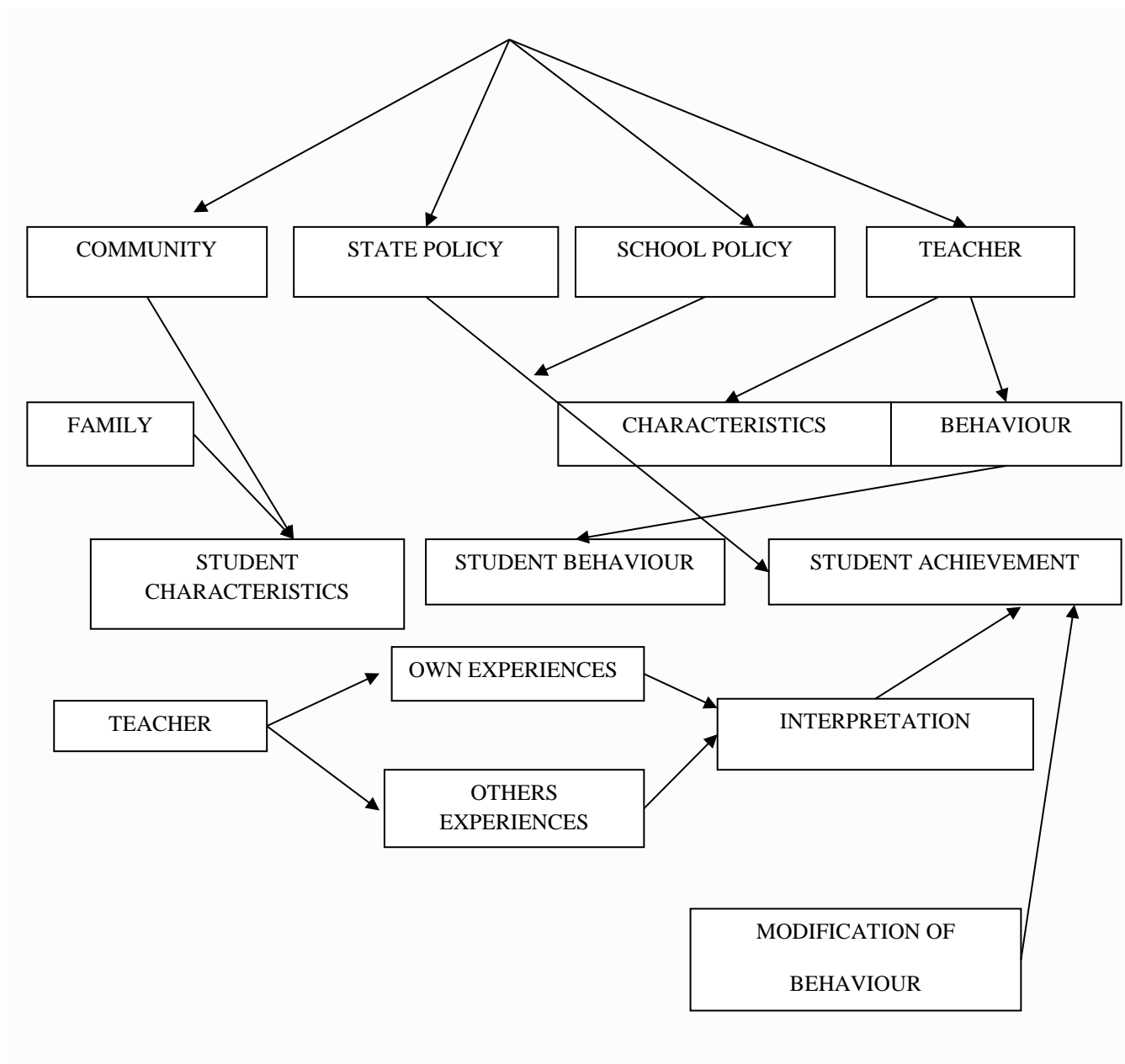


**CONCLUSION:**

For all these reasons, it is unlikely that software or a robot will replace human teachers any time soon.  It is even less likely if you consider that implementing   robots in the class room is not economically scalable and does not bring major financial benefits resourced contexts.

While robots can only be good trainers at solving mathematical problems or can be able to teach children how to read. However, the above mentioned skills are not enough for teaching, thus this kind of learning needs a human touch which is possible by human teachers only.

So, humanoid robot teachers cannot replace human teachers but they can assist the human teachers who are in human touch with the learners/students.

**REFERENCES:**

1.  https://www.frontiersin.org/articles/10.3389/feduc.2019.00125/full
2.  https://proshare.co/articles/advantages-and-disadvantages-of-robot-teachers?menu=Finance&classification=Read&category=Education%20Knowledge
3.  https://www.online-sciences.com/robotics/robot-teachers-uses-advantages-and-disadvantages/
4.  https://www.analyticsinsight.net/robot-teachers-in-india-unleashing-the-untold-stories/
5.  https://mad4india.com/business-innovation/artificial-intelligence-robots/