



Teachers' Perception Regarding the Role of Robotics in Enhancing Students' Teamwork, Communication, Creativity, and Confidence at the Primary Level in Islamabad

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Abstract:

The study entitled “Teachers’ perception regarding role of Robotics in Enhancing Students’ Teamwork, Communication, Creativity, and Confidence at the Primary Level in Islamabad” was conducted to explore that Robotics has a very significant effect on enhancing students’ abilities. The current study was qualitative in nature because it allowed the teachers to express their observations freely. How do they think that the robotics classes are preparing the students for the 21st Century skills? The target population of the study is composed of Elementary school teachers of private schools situated in Islamabad. The data was collected through the Convenience Sampling Technique. Open-ended questions were used to collect data. The current study examines the teachers’ perspective about how Robotics is enhancing the students’ skills, their teamwork, communication, creativity, and confidence, and preparing them for the 21st century skills. According to the teachers, Robotics Education has improved students’ teamwork skills because during the robotics class, students have to work in a group, they have to share responsibilities, listen to each other, try to solve problems, and they have to make sure that no one is left behind. This also helps to improve students’ communication skills because they discuss things with each other and with their teachers, they ask questions, and present their work. According to the teachers, this is really helpful to improve students’ communication skills at the primary level. Robotics classes improves students Creativity because when they are building a robot they try to implement their own ideas as well, according to the teachers by doing this not just their creativity is improved but this also improves their confidence level, because when they apply their own ideas and make something new this helps them to gain confidence, this also helps to eliminate the fear of failure and students learn how to solve problems step by step. According to the teachers, the Robotics Education really helps to build the 21st Century skills that will be helpful for the students in the future.

Keywords: *Robotics Education, Teamwork, Communication, Creativity, Confidence.*

Introduction

Research in the field of robotics has demonstrated that integrating robotics into the classroom gives students a project-based, real-world framework. (Ali et al., 2023). New technologies need to be introduced in all aspects of students' multi-functionality. This allows the student to acquire a broad understanding of the potential of the computer as an educational tool, rather than a deeper but divided one. The student will get to know most of the various applications that they may use later on. (Ilieva, 2010).

Research in robotics has indicated that it can influence students' learning across various subjects. This includes cognitive, meta-cognitive, and social skills like research abilities, creative thinking, decision-making, and teamwork-skills that are crucial for success in the 21st-century workplace. (Afari & Khine, 2016). The aim of the learning process in science and technology is to enhance students' abilities to ask and refine questions, debate ideas, make predictions, gather and analyse data, and draw conclusions. (Karahoca, Karahoca& Uzunboylub, 2011).

Literature Review

The 21st Century Skills

The framework for the twenty-first century states that students must acquire a basic set of skills that enable them to become engaged thinkers and responsible citizens in order to be ready for complex lifestyles and work situations. These include creativity, problem-solving, communication, leadership, and teamwork (Khanlari, 2013b). By fostering the development of all-around talents, such as critical thinking, 21st century skills help prepare individuals for an evolving economy. (Abualrob, 2019).

Individuals must acquire new knowledge as well as 21st-century abilities, including communication, creativity, critical thinking, teamwork, and problem-solving, because technology is becoming more and more complex. (Erol et al., 2023). Effective technology-based teaching strategies that emphasize advanced skills are also crucial, as is the availability of technology. Higher-level thinking is a component of 21st century skills since critical thinking, problem solving, creativity and innovation, and teamwork require students to use higher-order thinking. (Louis, 2012).

Robotics Education builds twenty-first century skills.

Robotics education is regarded as a means of developing the abilities for success in the twenty-first century (Lathifah et al., 2019). There are many technological tools used in the classroom for teaching and learning processes, but because of the physical representation of the robotic kits and the potential to improve students' communication skills, research indicates that educational robotics increases students' emotional and intellectual engagement more than other widely used

educational tools, like interactive smart boards. (Papadakis et al., 2021). In addition to learning robotics, students in robotics classes acquire sophisticated abilities and knowledge that they may utilize in their daily lives. (Khanlari, 2013b).

Robotics and teamwork skills.

Students should learn to be adaptable and, if needed, adjust to other team members in order to accomplish the team's objectives. They should also learn to listen well to others' opinions. Robotics is, therefore, a helpful tool for students in the twenty-first century since it fosters cooperation and teamwork. (Khanlari, 2013b). The benefits of educational robotics competitions include developing their technical skills, bridging the gap between classroom theory and real-world application, practicing teamwork and social skills, and improving their presentation abilities. (Zuhrie, et al., 2021).

Robotics and communication skills.

The 21st century learning framework states that students should be able to communicate with others for a number of reasons, including informing, instructing, and encouraging. Even in multilingual settings, students need to be able to communicate clearly in a variety of settings. Additionally, they should "create new ideas and increase both innovation and quality of work" by working and communicating with people from diverse social and cultural backgrounds in a respectful and productive manner. (Khanlari, 2013b).

Robotics and confidence skills.

Students become engaged learners who may act as researchers and acquire critical skills through practical robotics exercises. Through their physical work, they investigate, formulate theories, carry out experiments, and get feedback, which improves their critical thinking, problem-solving, and metacognitive abilities. Students consequently improve their self-confidence, reasoning, self-control, inventiveness, and creativity. (Evripidou, 2020).

The development of students' self-efficacy may be impacted by their implicit views about failure or their failure attitude. People who are preoccupied with their flaws are less able to bounce back from losses and are more likely to "lose faith in their capabilities." Preconceptions regarding failure and self-efficacy are linked to one's subsequent self-efficacy, according to a social cognitive perspective. (Ford, et al., 2023).

Robotics and creativity skills

The 21st century learning framework states that in order for students to succeed, they must develop their creativity. Because it fosters creativity, robotics can thus be viewed as a helpful tool for educating students for the twenty-first century. (Khanlari, 2013b). Students can develop creative solutions by solving a variety of computational problems when given projects intended to promote creativity in an educational setting. (Parlak et al., 2024)

Results

Teamwork.

"In robotics, some students are good at programming and some are good at communication there are some who are good at both. But robotics is a subject in which a single person can't make a robot and then identify the errors. So, if you have a team with you and there is a student who is good at programing can look after the programing, they will know about all the errors and everything. We have activities in our labs which are group tasks we have a group of four to five and then we divide the equipment and the students make their robots."

The robotics education enhances a lot of teamwork as compared to other subjects, because in this class, the students have to work in groups and each student has his or her own abilities that they will share with others and learn from others.

"In lab there is not the classroom environment if any student is having any question the student can ask openly but still if the student is shy from the teacher then the groups are made for the purpose so the students can ask the fellow members. If the fellow student also doesn't know than the student tells me that this student is having this problem and I also don't know the answer so could you please give the answer?"

The best way for the shy students to also participate in the activities is to make groups. The students help each other, and if they are unable to help each other, then the teacher helps them solve the problem.

"We divide the group in such a way that two students are the ones who work and the other two are the ones who don't then we know that the ones who work are going to work but if they don't then we ask them questions and when the questioning is done then we know how much the student have learned and for me I disassemble for the ones I know they haven't done then they have to do again."

Different teachers have different strategies to deal with the students who are not participating equally in the group activities. By asking the question, the teacher knows which student participated and which did not, and then the teacher gives them the task again so that they can learn.

Communication.

"Robotics is a subject in which you have to become social because you have to take help when you are making something you have to go to the other groups that we have made this thing but it's not working please help us. When the students come to me, I tell them that see if any other group has done it then ask them to help you. And when they have completed that then we celebrate it we take pictures, videos

then we share it in the groups. Then we appreciate each other that you're this thing was better than ours."

Robotics is a type of class in which the students have to become social; they have to communicate with their group members or even with other groups. This helps them gain confidence, and they can participate in different activities, give interviews, etc.

Creativity.

"First they ask do we have to do this or we can do something from ourselves. Then I tell them to first try whatever is given in your book then they start making that and then if they have enough time left then they tell that there is something extra which we want to add we want to enhance it a bit, we want to make it more presentable please give us some characters. For example, if they are making a building which is given in the book it is complete then they would want that we need some things extra then they ask for extra parts."

Students' creativity level increases when they build robots that are given in their books, and then they try to enhance them; they want to add their own ideas as well. The teacher's instruction does not restrict them to just the limited tasks; instead, they ask the teacher to give them more parts because they want to enhance the robot and they want to make it more presentable.

Confidence.

"I try that what they are studying in Science or Maths through these subjects they implement it so their confidence level is increased. For example, in Science if they have studied anything like Forces related, so they applied it over here because of this their confidence got increased in Science as well. They got a better understanding that, this is how the force is applied."

"I am attentively watching everyone. When I have given them permission that they can do anything, then, if they ask me that we can do this or not then I allow them that they can experiment because of this their fear disappears that they might do it wrong."

Students don't lack confidence after attending the class lectures and the lab classes. They have become very socialized and gained enough confidence that when they are given any topic, they can talk about it. If the interviews are being conducted, they can easily give an interview; they are not camera-shy.

Conclusion

In conclusion, research on teaching robotics highlights that robotics is having an effect on students' teamwork, communication, creativity and confidence. According to the results, because of learning robotics, students' teamwork, communication, creativity, and confidence are greatly affected. The teachers should try their best that the students communicate with each other, help each other to solve the problems this is a very good way to improve the students teamwork skills their communication with one another and also with the teacher and because learning robotics, their confidence level increases because they have learned something new and it also improves their creativity level, because the students are always trying to improves the work they have done.

Future Research

I didn't include the Secondary and Higher Secondary school teachers. The participants in my research were only the teachers; in future researches the students can also be included, and their parents as well. Instead of conducting the Qualitative research, mixed-method research can be conducted. There can also be a comparison between different cities.

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