ASIA-AFRICA JOURNAL OF RECENT SCIENTIFIC RESEARCH ISSN: 2814-0400 VOL. 4(1)
doi:10.5281/zenodo.1234567 Available online at:
www.journals.iapaar.com/index.php/aajrsr

Adoption of Robotics in Educational System: Trends and Implications for Nigerian Schools

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Abstract
The aim of this paper was to investigate the integration of robotics into Nigeria's educational system. The paper adopted literature reviews and opinions on the potential benefits. It was discovered that the adoption of robotics in education offers transformative potential by revolutionizing traditional paradigms and fostering critical competencies in science, technology, engineering, and mathematics (STEM). Despite significant challenges such as inadequate funding, poor infrastructure, an unreliable power supply, and a shortage of qualified teachers, the adoption of robotics education in Nigeria presents profound opportunities for enhancing student engagement, critical thinking, and problem-solving skills. The paper explores the concept and evolution of robotics, current trends in global and Nigerian educational settings, and the specific implications of adopting robotics in Nigerian schools. It also identifies the barriers hindering widespread implementation and offers strategic recommendations to overcome these obstacles. By addressing these challenges and leveraging robotics education, Nigeria can prepare its students to thrive in a technology-driven world, contributing to national development and aligning with global educational trends. The study underscores the need for collaborative efforts among stakeholders to ensure equitable access to robotics education and sustainable implementation across the country.

Keywords: *robotics, robots, education*

Introduction

The intersection of robotics and education has sparked a revolution in teaching and learning worldwide, offering innovative pathways to equip students with the skills and knowledge necessary for success in the digital age. Robotics is a multidisciplinary field encompassing engineering, computer science, and other disciplines focused on the design, construction, operation, and use of robots. Robots are devices that have some degree of autonomy to help their

owners carry out specific tasks (Felicia & Sharif, 2014). At its core, robotics seeks to create machines that can perform tasks autonomously or semi-autonomously, either in place of humans or in collaboration with them. Integrating robotics into the educational system introduces a powerful tool for teaching and learning.

Nigeria's education system is structured into several tiers, including early childhood education, primary education, secondary education, and tertiary education. Nigeria's education system has made progress in increasing access to schooling from six years of primary education, three years of junior secondary education, three years of senior secondary education, and four years of tertiary education. In Nigeria, education is primarily a public undertaking in which the government has actively and completely intervened. The goal of Nigeria's developed education policy is to use education as a means of accomplishing national development (Amaghionyeodiwe & Osinubi, 2006). Since education is a tool for change, the adoption of robotics in the Nigerian education system presents an opportunity to catalyze transformative advancements in teaching and learning.

In Nigeria, where educational reform is both a pressing need and a beacon of hope for socio-economic development, the adoption of robotics in schools could hold profound implications. By integrating robotics into the curriculum, Nigeria can harness the potential of technology to revolutionize traditional educational paradigms and equip students with the skills needed for the future. The adoption of robotics in education represents a paradigm shift in teaching and learning, leveraging technology to enhance student engagement, critical thinking, and problem-solving skills. This adoption encompasses various levels of education, from primary to tertiary institutions, and spans across disciplines, including science, technology, engineering, and mathematics (STEM) education (Henry & Mohamad, 2014).

Therefore, by embracing robotics, Nigeria can empower its students to become innovators, problem solvers, and active participants in driving societal change and economic development. Furthermore, the adoption of robotics in education aligns with global trends towards STEM (Science, Technology, Engineering, and Mathematics) education, positioning Nigerian students to compete and contribute on an international scale. In this way, the integration of robotics into the Nigerian education system could serve as a catalyst for positive change, shaping the trajectory of education and preparing students to thrive in the digital age in an increasingly technology-driven world. By examining the adoption of robotics in the educational system, the prevailing trends, and the potential implications for Nigerian schools, this paper aims to shed light on the opportunities and challenges that accompany this transformative journey.

The Concept of Robotics

Robotics encompasses the design, development, and utilization of machines capable of carrying out tasks autonomously or semi-autonomously. According to the International Organization for Standardization (ISO), a robot is an automatic, position-controlled, programmable, multi-functional manipulator with several axes. It can process various materials,

parts, tools, and special devices through programmable automation to perform intended tasks (Chen et al., 2024). Four main components make up a typical robot structure: the actuation system, which works like a human hand; the drive-transmission system, which uses a power source to transmit force and motion to the actuator; the control system, which resembles a human brain and consists of a control computer, control software, and servo controllers; and the intelligent system, which usually consists of a perception system and an analytical decision-making intelligent system. At its core, robotics combines principles from mechanical engineering, electrical engineering, computer science, and artificial intelligence to create intelligent systems that interact with and manipulate their environments. The ultimate goal of robotics is to automate machines to carry out specific tasks efficiently and effectively (Amaifeobu, Iyamu, & Adewunmi, 2023).

The concept of robotics has historical roots in both ancient automata and more modern technological advancements. First printed in 1920, the term "robot" was used in the play R.U.R. (Rossum's Universal Robots), written by Czech dramatist Karl Kapek. Robota is the Czech word meaning laborer or serf (peasant). The robots take control and wipe off humanity, as is typical in early science fiction. The word "robotics" was created and made popular by Isaac Asimov, a prolific science fiction author. Asimov was a visionary who, in the 1930s, imagined a positronic brain that could control robots; this idea was two decades ahead of digital computers. The Three Laws of Robotics, which he developed, are as follows: a robot must obey human commands unless doing so would violate the first law; it must not injure humans or allow humans to come into harm's way; and it must defend its own existence, so long as doing so does not conflict with the first or second laws (Williams, 2021).

Throughout history, prototype robots that mimic the traits of animals or people have been created by scientists and artisans. But because these creations lacked the intelligence and autonomy of contemporary robots, they could only be categorized as mechanical gadgets that primarily used mechanical and physical principles to achieve automated functions. These creations laid the groundwork for later robotics studies by showcasing the degree of engineering and mechanical manufacture at that time. The industrialization of robots began when Joseph Engelberger, known as the Father of Robotics, established Unimation Corporation in 1958. This was the first robot manufacturing facility in history. An important turning point in the global development of industrial robotics was reached in 1978 when Unimation created the Programmable Universal Machine for Assembly (PUMA) (Chen et al., 2024).

Figure 1: First Unimate Robot

Thanks to advances in transdisciplinary integration, intelligent algorithms, and sensor types, robotics has grown dramatically in the last few years. Since the first industrial robotic arms, technology has developed into a variety of robots, including bionic, soft, and nanorobots. Robotics finds applications in diverse industries, including nuclear power plants, security/military, manufacturing, education, medical science, agriculture, and others (Fabiyi, Abdulmalik, & Falade, 2016). As robots become more intelligent, adaptive, and capable of interacting with humans in complex environments, the future holds promising possibilities for further advancements and the integration of robotics into everyday life.

Trends in Global and Nigeria Educational Settings

Robotics integration in educational settings has been growing rapidly globally, indicating a major shift in teaching approaches and principles of learning. Around the world, there is a trend to improve STEM (Science, Technology, Engineering, and Mathematics) education by integrating robotics into the curriculum (Darmawansah et al., 2023). Developed nations like the United States, the United Kingdom, Japan, and South Korea, whose educational systems place a strong emphasis on robotics, have been at the forefront of this movement.

Figure 2: Robotics Classroom in a Developed Country

This trend stems from the realization that robotics projects help students develop their creativity, analytical thinking, and ability to solve problems (Ouyang & Xu, 2024). In these nations, robotics education starts in the early grades and extends through college. It is backed by extensive programs like VEX Robotics and FIRST Robotics, which provide students competitive platforms and practical experience (Stoffova & Hyksova, 2023).

In contrast, robotics adoption in Nigerian schools has been gradual and poses numerous challenges. While there has been increased interest and some innovative efforts, the introduction of robotics into Nigeria's educational system is mainly driven by initiatives from the private sector and non-governmental organizations. The promotion of robotics has been greatly aided through competitions by programs like RoboRave and Robot Master of Nigeria (Baun Robotics, 2021). One of the major problems is the absence of infrastructure and resources in Nigeria that would enable the widespread use of robotics. Many schools lack the financial means to acquire robotics equipment or the expertise needed to successfully incorporate them into the curriculum.

This stands in contrast with advanced nations, where significant investments in educational technology have made it easier to incorporate robotics into school settings. Despite the obstacles that have impeded widespread adoption, robotics education is becoming increasingly important in Nigeria, given the demand for STEM skills and the global movement towards technological proficiency.

Robotics Adoption in Nigeria Schools

Robotics integration in Nigerian schools is progressively picking up steam as a result of initiatives to improve STEM instruction and provide students with 21st-century skills. Since gaining independence, STEM education has greatly helped Nigeria as a whole. Science and technology are clearly given priority in the Nigerian educational system, as stated in the National Policy on Education (Aina, 2022). The use of LEGO Education robotics kits is one well-known instance of how robotics is being adopted in Nigerian classrooms. These kits, which include LEGO Mindstorms, give students practical programming and robotics learning experiences (Souza et al. 2018).

Adam & Mark, (2008) highlighted that LEGO Mindstorms is ideal for educational settings for several reasons. Firstly, its versatility allows students to design, build, and program a range of devices using ready-made plans or shared designs from other users, facilitated by the reusable nature of LEGO bricks that simplifies assembly and testing.

Figure 3: LEGO Mindstorms Kit

Secondly, LEGO Mindstorms holds strong student appeal, particularly among students familiar with mechanical devices, as it offers hands-on experience in assembling parts and creating functional robots, leading to immediate satisfaction upon successful completion. Lastly, the kit's comprehensive features, including sensors, motors, and a programmable device for controlling robot movement and reactions, provide all necessary components to build diverse robots for educational activities (Church et al., 2010).

Additionally, several Nigerian schools have incorporated robotics into their curricula through robotics contests, extracurricular activities, and STEM groups (Corrienna et al., 2020). These initiatives allow students to explore robotics concepts beyond the classroom, engage in project-based learning, and participate in regional and international robotics challenges. In higher education, universities and technical schools are including robotics in their computer science and engineering curricula (Pathan & Bari, 2021).

Figure 4: Nigerian Students participating in a Robotics Contest

Advanced robotic platforms are available in labs for students to use for research and experimentation. Graduates with this practical experience are well-prepared for positions in automation, robotics engineering, and related industries. The promotion of robotics education is also aided by government programs. For example, the Nigerian Federal Ministry of Education has implemented initiatives to incorporate STEM topics into the country's curriculum (Fomunyam, 2019). These efforts aim to equip Nigerian students with the skills needed to excel in a technology-driven world and contribute to economic development. Despite these positive developments, challenges remain in the widespread adoption of robotics in Nigerian schools.

Schools Currently Adopting Robotics Education in Nigeria

Several schools in Nigeria are now incorporating robotics education into their curricula, aiming to enhance students' problem-solving skills, technical knowledge, and proficiency in STEM fields. Some notable examples include:

i. Glisten International Academy, Abuja
ii. Imagine Stem Academy, Lagos
iii. 9jaCodeKids, Rivers State
iv. Code Campus International, Abuja
v. Caleb British International School, Lagos
vi. DeZion Heritage School, Lagos
vii. American International School, Abuja
viii. Bizmarrow Technologies, Abuja
ix. STEM Professionals Ltd, Port Harcourt
x. Loyola Jesuit College, Abuja
xi. TechQuest STEM Academy, Lagos
xii. STEM Child Care Academy, Abuja

Adoption of Robotics in Nigeria Schools: Implications and Insights

The adoption of robotics in Nigerian schools carries significant implications and insights for the educational landscape of the country. Introducing robotics into schools can revolutionize the way students learn and engage with STEM (Science, Technology, Engineering, and Mathematics) subjects. STEM education is a teaching methodology that combines science, technology, engineering, and mathematics into a coherent, application-based learning framework (Afari & Khine, 2017). Studies in the field of robotics have reported that the integration of robotics into the curriculum has a potential impact on students' learning in different subject areas (Physics, Mathematics, Engineering, Informatics, and more) and on personal development, including cognitive, meta-cognitive, and social skills, such as research skills, critical thinking, decision-making, problem solving, all of which are being essential skills necessary in the workplace of the 21st century (Eguchi, 2010).

Critical thinking plays a pivotal role in the adoption of robotics in Nigerian schools, offering a pathway for students to navigate and engage with emerging technologies effectively. In the context of robotics education, critical thinking comprises the capacity to assess, analyze, and utilize information and abilities obtained from practical encounters with robotic platforms. As noted by Hehai et al. (2022), critical thinking in robotics education involves not only understanding technical concepts but also the capacity to solve problems creatively, collaborate with peers, and adapt to new challenges. Through projects involving robots, students are urged to explore real-world issues, design creative solutions, and evaluate those ideas critically (Ashinze, 2022).

Figure 5: STEM Education in Nigeria

Since robotics incorporates concepts from science, technology, engineering, and mathematics (STEM), it requires students to make connections between various disciplines in order to solve complicated issues. This is one way that critical thinking is emphasized in robotics education (Darmawansah, 2023). This interdisciplinary method encourages students to apply knowledge from several fields to real-world situations, which develops critical thinking skills. For instance, students must use mathematical ideas like geometry and trigonometry to compute angles and distances while also taking engineering principles like mechanical design and motor control into account while creating and programming a robot to navigate a maze.

Furthermore, critical thinking in robotics education is fostered through collaborative learning experiences. Robotics projects often involve teamwork, where students work together to design, build, and test their robots (Gratani & Giannandrea, 2022). Students who collaborate get to experience a variety of viewpoints and approaches to problem-solving while also improving their communication and group-working skills. By participating in joint problem-solving activities, students learn to examine several solutions, consider alternative viewpoints, and justify their reasoning, a process that cultivates critical thinking skills and prepares them for the challenges of the future workforce.

Additionally, the infusion of robotics into education not only fosters critical thinking but also augments problem-solving skills, rendering it a valuable asset within Nigerian schools. The introduction of robotics into Nigerian classrooms has helped students learn a critical skill:

problem-solving. Incorporating robotics into the curriculum forces students to address complicated problems through analysis, identification, and hands-on learning. Robotics education cultivates a problem-solving attitude by posing tasks that require students to apply STEM ideas. According to a study by Katniyon et al. (2023), there is a great deal of potential for robotics education in Plateau State to help students become more adept at solving problems.

Robotics integration into Nigerian schools also aligns with global educational trends that stress the significance of problem-solving skills for the 21st century. Robotics projects frequently include open-ended questions with no right or wrong answer, which pushes students to use their imaginations and consider several approaches. This innovative approach to problem-solving is essential for equipping students to handle issues in the fast-changing technology environment of the future (Romero, Lepage, & Lille, 2017). By engaging in robotics education, students gain the capacity for both critical and creative thought, skills that are highly sought after in the innovation-driven economy of today.

Moreover, the adoption of robotics in Nigerian schools can close the gap between theoretical learning and practical applications. Many researchers believed that robotics activities empower students to apply theoretical knowledge to practical scenarios, foster a deeper understanding of concepts and principles, and greatly contribute to the sustainability of the environment. These led to the implementation of robotics curricula or activities in secondary and primary schools in many developed nations (Corrienna et al., 2020). This experiential learning approach not only enhances technical skills but also cultivates important soft skills such as teamwork, communication, and perseverance. Students develop confidence in their abilities as they navigate challenges and collaborate with peers to achieve common goals.

Furthermore, integrating robotics into the educational system can inspire innovation and entrepreneurship among Nigerian students. Exposure to robotics technologies at a young age sparks curiosity and interest in STEM fields, potentially leading to future careers in robotics, engineering, or related industries (Cirfat, Katniyon, & Duguryil, 2023). This could help Nigeria establish a competent labor force that can propel both technical breakthroughs and economic expansion. Additionally, by involving students with a variety of interests and experiences, encouraging a culture of lifelong learning, and assisting in the adaptation of new technology, the use of robotics in education can advance inclusion.

Challenges in the Adoption of Robotics in Nigeria schools

The adoption of robotics in Nigerian schools also presents certain challenges and considerations. This conforms to the findings of Edeh (2020) that there are a number of obstacles that could prevent robotics from being implemented effectively. These include concerns with funding, dependable power supplies, inadequate physical infrastructure, and internet connectivity. Additionally, there is a need for adequate teacher training and professional development to support educators in integrating robotics into the curriculum. An article by Zainab (2017) highlights the resistance among stakeholders in Nigeria's education sector against the incorporation of robotics

into the education system. Addressing these challenges necessitates collaborative efforts from governments, educators, business partners, and community leaders to promote the widespread adoption of robotics, ensuring equitable access and quality implementation for all Nigerian schools.

Inadequate Budgetary Allocation

The widespread adoption of robotics in Nigerian schools is significantly hampered by inadequate budgetary allocation. The inadequate funding allocated by past governments to the education sector has led to subpar service performance. It is common knowledge that if robotics is to be completely integrated into schools in Nigeria, the outdated infrastructure found in the schools would not be sustainable (Fabiyi, Abdulmalik, & Tiamiu, 2016). Additionally, ongoing maintenance and upgrades of robotics facilities require continuous investment. Implementing a comprehensive robotics program in schools requires not only setting up training facilities and well-equipped laboratories but also acquiring robotics kits and associated technology resources. This is beyond the reach of schools, especially in underprivileged and rural areas where money for education is already stretched thin. Lack of financing makes it difficult for schools to keep up with the rapid developments in robotics technology, which results in outdated facilities and resources that don't give students a competitive advantage in STEM fields (Cheryan et al., 2014). Securing funding through government grants, corporate sponsorships, or partnerships with philanthropic organizations is crucial to alleviating financial burdens and ensuring sustainable robotics programs in schools.

Lack Of Physical Infrastructure

One of the primary challenges to adopting robotics in Nigerian schools is the lack of adequate physical infrastructure to support technology-driven education. Many schools in Nigeria at all levels lack libraries equipped with scholastic materials and well-equipped science laboratories. According to Dimitris (2013), these facilities are essential for fostering critical thinking, problem-solving, creativity, teamwork, and communication skills, as they provide students with the structured and disciplined environments necessary for meaningful educational experiences. The integration of robotics in schools requires access to modern facilities and equipment to support practical applications and experimentation. Without proper infrastructure, schools face challenges in implementing effective robotics programs that engage students and enhance their learning outcomes. The absence of physical infrastructure further affects the quality of instruction and monitoring. Without a designated area for robotic activities, teachers find it difficult to plan and lead hands-on learning activities. Limited access to resources and equipment restricts students' exposure to a broader range of robotics concepts and applications, hence limiting the diversity of robotics projects they can accomplish (Grubbs, 2013).

Inadequate Power Supply

Another significant challenge hindering the adoption of robotics in Nigerian schools is the issue of dwindling electrical power supplies and internet connectivity. In Nigeria, there has been a reported decline in power generation and distribution, leading to frequent electricity outages and

interruptions (Fabiyi, Abdulmalik, & Tiamiu, 2016). This unreliable power infrastructure poses a significant obstacle to incorporating robotics into Nigerian schools effectively. Without a reliable standby alternative power supply, interruptions during robotics sessions become inevitable, disrupting the continuity of learning experiences for students. Also, fluctuations and abrupt power surges can damage sensitive electronic components, which can result in equipment failure and expensive repairs (Olczykowski, 2021). This adds to the costs that already burden already tight budgets in schools. Additionally, the digital divide in educational access is exacerbated by an unreliable power supply. Even though urban locations might have more advanced infrastructure and easier access to backup power options like inverters or generators, rural schools frequently suffer from power outages. The disparity in technology literacy and proficiency between urban and rural populations is widening as a result of students in these underprivileged groups being further excluded from accessing high-quality robotics instruction (Van Maarseveen, 2020). The inconsistency in electrical power supply not only affects the operational efficiency of robotics equipment but also undermines the overall integration of technology into educational practices.

Internet Connectivity Issues

Robotics adoption in Nigerian schools is beset with significant challenges due to poor internet connectivity. Reliable internet access is necessary for modern educational practices, especially robotics, which frequently calls for online resources, programming tutorials, and collaborative learning platforms. Unfortunately, a lot of Nigerian schools, especially those in rural areas, have inadequate internet access. The implementation of robotics education is severely hampered by this lack of access, creating a digital divide between urban and rural areas. Urban schools are more likely to have better internet infrastructure than rural ones, which limits students' access to vital online learning materials due to inconsistent or nonexistent connectivity (Obioma, 2023). Even in places where connectivity to the internet is available, the cost of internet services might be unreasonably high. Since many schools have tight budgets, they are unable to cover the hefty expenses of maintaining reliable, fast internet access. Due to these financial limitations, schools are less likely to incorporate internet-dependent technology, such as robots, into their curricula (Turugare & Rudhumbu, 2020). As a result, students frequently have to rely on slow and unstable connections, which might interfere with learning and lower the standard of robotics instruction.

Lack Of Qualified Teachers And Lecturers In Nigerian Schools

The lack of qualified teachers and lecturers is a major impediment to the adoption of robotics in the Nigerian system of education. Nigeria is severely lacking in experts qualified to teach robotics. Robotics training requires a deep understanding of multiple fields, such as computer science, electrical engineering, and mechanical engineering. Nonetheless, there aren't many people in Nigeria with these particular kinds of skills. The dearth of academic programs providing in-depth instruction in robotics and related subjects is one of the contributing factors. There are limited robotics-specific programs in Nigeria, per an article by Idoko (2024). In Nigeria, professional development possibilities in robotics are sometimes limited for teachers currently employed in the educational system. Teachers are ill-prepared to teach subjects like robotics since

the existing teacher training programs do not sufficiently address emerging technologies. Professional development programs in Nigeria tend to emphasize traditional themes more than current technical development (Ogunyinka, Okeke, & Adedoyin, 2015). Furthermore, the support systems for ongoing professional development are insufficient, discouraging teachers from pursuing additional education (Ogunyinka, Okeke, & Adedoyin, 2015) .

Recommendations

Based on the identified challenges in the adoption of robotics in Nigerian schools, several recommendations can be proposed to facilitate successful integration and overcome the barriers hindering progress:

i. To address the issue of insufficient budgetary allocation, a multi-faceted approach is recommended. The Nigerian government ought to increase funding for STEM education while ensuring consistent investments in training facilities, laboratories, and robotics kits. Forming partnerships with businesses in the private sector and interacting with NGOs and philanthropic groups might yield more funding and resources. Additionally, educational institutions seek grants and international aid, as well as sustainable investment options, including endowment funds and public-private partnerships, to maintain long-term financial stability.

ii. The establishment of state-of-the-art libraries and science laboratories at all levels of education ought to be a top priority for the government, in collaboration with non-governmental organizations and the private sector. This entails building cutting-edge facilities, especially those made for technology-driven learning, equipped with all the resources required to facilitate robotics programs. By establishing specific areas for robotics activities, teachers can effectively organize and facilitate experiential learning activities that foster students' creativity, critical thinking, problem-solving, teamwork, and communication skills. Improved facilities will enable students to work on a range of robotics projects, enhancing their learning outcomes and preparing them for the next generation of technology.

iii. Educational institutions should make investments in sustainable alternative power sources, such as solar panels, inverters, and generators, to address the issue of insufficient power supply and guarantee a continuous supply of electricity during robotics programs. This will mitigate the possibility of power disruptions and safeguard delicate electronic components from damage from power fluctuations. Establishing infrastructure development as a top priority in rural areas is essential to closing the technology literacy and competence gap between students in urban and rural communities. Schools may effectively include robotics into their academic programs while offering every student access to top-notch technological education by making sure there is a constant supply of power.

iv. The government should to give top priority to establishing more internet infrastructure, especially in rural areas, in order to guarantee that all schools have fair access to

dependable, fast internet. Partnering with companies in the private sector can help provide the required technological support and subsidized internet services. To overcome geographic limitations, schools should explore alternative connectivity options like satellite internet or wireless mesh networks. The high costs of internet services can be somewhat offset by grants and financial aid from governmental and non-governmental groups, allowing schools to continue operating with dependable connections. By improving access to the internet, schools will have the means to incorporate robotics into their academic programs and improving standards of instruction.

v. Lastly, educational institutions and the government should collaborate in order to create and expand robotics-specific programs at universities and technical colleges. To provide present teachers with the robotics expertise and skills they require, specialized professional development programs should be developed. This includes training programs, certification exams, and opportunities for continuous training with an emphasis on cutting-edge technologies. Exposure to cutting-edge training and expertise can be gained through collaborations with global educational institutions and technology companies. Nigeria can establish a workforce capable of instructing robotics and guarantee that students are ready for the future's technological developments by investing in the education and continuous professional development of its instructors.

Conclusion

The adoption of robotics into the Nigerian education system marks a significant step towards modernizing and enhancing the country's educational landscape. As a multidisciplinary field, robotics offers a unique opportunity to enrich STEM education, fostering critical thinking, problem-solving, and innovation among students. Despite the challenges, such as inadequate funding, poor infrastructure, unstable power supplies, and a shortage of trained teachers, to name a few, robotics in education has enormous potential benefits. By transforming conventional learning paradigms, robotics education can provide students with the skills they need to succeed in a technology-driven world. By promoting hands-on learning and interdisciplinary collaboration, robotics helps bridge the gap between theoretical knowledge and practical applications. Furthermore, it prepares students for future careers in STEM fields, contributing to Nigeria's socio-economic development and positioning the country as a competitive player on the global stage. To realize this vision, a concerted effort is required from all stakeholders, including the government, educational institutions, the private sector, and non-governmental organizations. Increasing funding, improving infrastructure, ensuring reliable power supply, enhancing internet connectivity, and investing in teacher training are crucial steps towards successful robotics adoption in Nigerian schools. By addressing these challenges and leveraging the opportunities that robotics education offers, Nigeria could empower its students to become leaders and innovators, propelling constructive transformation and advancement in the modern era.

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