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The Role of STEAM Education Approach in Fostering Creativity and Innovation among Learners in Edo State

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Abstract

In recent times, the STEAM (Science, Technology, Engineering, Arts, and Mathematics) education has gained active recognition in the academic circles on its inherent capability of fostering creativity and innovation particularly in developing countries like Nigeria. This study investigates how STEAM education can promote creative and innovative thinking in students and what are its implementation problems. The researchers used a mixed-method approach, whereby students and teachers of secondary schools were sampled using questionnaires and interviews for data collection. The quantitative data was subjected to descriptive statistics and correlation analysis, and the qualitative data was analyzed thematically. The findings show that STEAM education enhances creative problem apprehension and resolution capabilities amongst students and teachers, who agree with the positive relations and given creativity to this approach. The study also identifies some critical concerns as challenges, such as unavailability of adequate resources and equipment and lack of practitioners' knowledge on curriculum design or its curriculum structure and prescribed components. It suggests solutions for policymakers, schools, and teachers to combat those concerns and create a more favorable atmosphere in favor of STEAM education. The practical implications of the study are, therefore, because STEAM education is so effective in educational transformation in Edo State, much though there are these challenges, STEAM education should be relied on.

Keywords: *STEAM Education, Creativity, Innovation, Interdisciplinary Learning, Educational Challenges, Edo State, Project-Based Learning, Teacher Training.*

1. INTRODUCTION

1.1 Background of the Study

One of the sectors that are changing quite fast is education systems as they prepare students for the 21st skills, which are based on creativity and innovation. Introduction and Growth of STEAM Education which is a unique integration of Science, Technology, Engineering, Arts and Maths

education, is one such approach. Although STEM education focuses heavily on technical aspects, when dealt with STEAM where Arts is incorporated, its basic tenets as defined by education with innovation are broadens.

In Edo state Nigeria, education systems are beginning to appreciate the limitations of only applying rote memory anchors to students in an age where creative problem solving skills are the core components of economic activity. As a result of globalization, availability of technology and change in the industrial environment, there is a call for educational systems that create and or motivate creative intellectuals who will transform the industry. STEAM education provides a holistic paradigm wherein the learners can think critically, creatively, and solve problems for practical purposes **(Mishra, Koehler, &Henriksen, 2011)**.

Edo state, as part of the wider education reform program in Nigeria is beginning to integrate STEAM approach in the curriculum based on its EdoBest2.0 initiative. However, the implementation of STEAM is still nascent, with many schools grappling with how to fully incorporate this approach into existing frameworks. This study seeks to explore how STEAM education can foster creativity and innovation among learners in Edo State.

1.2 Statement of the Problem

Although there is an ongoing process to "clean up" the quality of education in Edo State, many schools are still emphasizing the need for book smarts at the expense of students' creative capacities. Tested on the lowest levels of thinking recall…preparing for it has become trivial, when historically, it has been a resource rich in content just as relevant to forecasting tomorrow as…students understand their crippling economic debt. **(Robinson, 2010)**

Nigeria still lags behind in the league table for competitive graduates and with experience based learning these are the type of educational reforms Nigeria desperately needs. One potential solution has been to integrate the ARTS into STEM, creating STEAM education which promotes a more holistic learning environment for students where students learn science and technology alongside artistic processes of inquiry **(Yakman, 2010)**. Albeit, there is dearth of empirical study on the extent to which the strategy has been employed and the consequences of this method on students' creativity in innovation in Edo State.

1.3 Purpose of the Study

The purpose of this study is to investigate the role of STEAM education in fostering creativity and innovation among learners in Edo State. The research aims to:

- Explore how the STEAM approach enhances students' creativity and critical thinking.
- Assess the impact of STEAM education on students' problem-solving skills.
- Evaluate teachers' perceptions of the effectiveness of STEAM education in promoting innovation.
- Identify challenges faced by schools in implementing STEAM education in Edo State.

1.4 Research Questions

This study will address the following questions:

- How does STEAM education foster creativity and innovation among learners in Edo State?
- What is the relationship between STEAM education and students' problem-solving abilities?
- How do teachers perceive the role of STEAM education in fostering creativity?
- What challenges are faced in implementing STEAM education in schools across Edo State?

1.5 Significance of the Study

This study is significant for several reasons. First, it contributes to the body of knowledge on the role of interdisciplinary learning approaches in enhancing student outcomes. Specifically, it provides insights into how STEAM education can be leveraged to address educational challenges in Nigeria, particularly in Edo State. Furthermore, the findings of this study will be useful to policymakers, educators, and curriculum designers looking to foster creativity and innovation in classrooms. By understanding how STEAM education influences learners, this research could inform future educational reforms aimed at improving academic performance and student engagement in Nigeria.

The study also has practical implications for teachers, as it provides evidence-based strategies for integrating STEAM principles into daily classroom activities. Finally, the research serves as a foundation for future studies that can explore STEAM education in other regions of Nigeria.

1.6 Scope of the Study

This research focuses on secondary schools in Edo State. The study examines how STEAM education influences creativity and innovation in learners. The population for the study includes teachers, students, and educational administrators in selected schools across Edo State.

2. LITERATURE REVIEW

2.1 Theoretical Framework

STEAM education is grounded in constructivist theories, **(Bruner, 1960, Papert and Harel, 1991)**, which posit that students learn by constructing their knowledge through engagement rather than the traditional passive way of receiving information. The Constructivist theory according to Jean Piaget in psychology is based on the idea that students are not empty receptacles waiting to be filled with knowledge by teachers, and learning is actively constructed by the learners9670.png based on their experiences. STEAM manifests this through the hands-on, project based approach where students are encouraged to experiment and create their own learning environment that forces critical thought and creativity out of them **(Piaget, 1972)**.

2.2 STEAM Education: An Overview

STEAM has to do with the development of STEM (Science, Technology, Engineering, and Mathematics) adding an A for Art, proposing a more integrated work model with support! It is about crossing silos, mixing creativity into the technology focus so that people learn to both solve problems and create new innovations or expressions. Integration of the arts in this way, plus a focus on these social issues, encourages students to consider how various solutions could be both functional and beautiful with potential societal impact that is far reaching (Land, 2013).

The financial disadvantage of the knowledge worker and the looming shadow of AI over white-collar jobs can finally end as we embrace true 21st century learning habits — but that shift from STEM to STEAM is not just about adding a letter, it signifies nothing less than tearing down our entire conception of what education means. Arts-based STEM integration creates a different lens for students when they are viewing scientific and technological ideas and concepts **(Yakman, 2010)**, which fosters higher level thinking skills such as analysis, synthesis, and evaluation. This practically-oriented model frees students from the monotony of memorization to become makers in their own right, as well as innovators and problem-solvers. The arts element supports this by allowing the learner to extend learning beyond what is taught in the literature by applying scientific concepts in different innovative ways.

Another of the purposes that are followed in STEAM education is the development of creative and innovative thinking abilities, which are gaining importance in the new global competitive environment marked by intense turbulence. According to the research conducted by the World Economic Forum in 2016 creativity is included into top three skills that are applicable at the contemporary work place with the emphasis on the role of critical and creative thinking for different sectors of the economy. In this respect, **Henriksen (2014)** argues that STEAM projects help to nurture these inclinations because learners have to solve problems using both technical and art skills, across the disciplinal fields. This dual focus prepares the learners in a way that will enable them to move from one field to another in their careers a skill set that has now become relevant in the current world economy.

The other component which is used in STEAM is PBL, an assignment which is a skills-based learning process which enables the students to solve real-world challenges as well as attain academic milestones across various disciplines. PBL engages students in active problem solving and makes them solve problems using science content, technical skills and creativity to find a worthy solution to the posed problem **(Land 2013)**. This is akin to system integration procedures that exist in such sectors as technology, design, and engineering whereby integrated work across and between numerous subdomains brings about dramatic breakthroughs **(Bequette&Bequette, 2012)**. Moreover, as established by Bell (2010), the use of PBL is likely to enhance students' interest and their knowledge

retention because of the real-life contexts of issues incorporated in the curriculum.

STEAM education also contributes in availing the equality and diversity to ensure more people practice STEM education which is limited in practice. Arts weaves in the opportunity for the learners who might not consider stemming solely necessary technical courses hence promoting the diversity of the learners. As pointed out by **Maeda (2013)**, art-science integration brings educational opportunities to a larger pool of learners to increase the pool of talent for technology based careers.

Also, STEAM focuses on the acquisition of 21st-century competencies including teamwork, information sharing and flexibility. **The National Research Council (2012)** notes that in order to succeed in global society, the students need to be able to collaborate, or, at least, be capable of teaming with students from different disciplines and present their ideas coherently. The fact that STEAM education incorporates various fields makes the formation of such skills possible since the students have to work with their peers from different fields in order to accomplish their tasks. Altogether, the STEAM education is an innovative concept of students' preparation for modern life and occupation. That is why when we interrelate arts with stem it widens more ways to very special solutions to the challenges thus procreating generations of innovative minds, creators and chairs in different disciplines.

2.3 STEAM Education in Nigeria

Even now the shift toward the STEAM education in Nigeria is not very advanced, for the country's conventional educational systems having promoted memorization without much thinking, or creativity and innovation. Nigerian education can therefore be seen to have had traditional style or approach in the past whereby students were only fashioned to take examinations without any encouragement for creativity or for as a result of wanting to know more than what the syllabi contained. However, because of the global advancement in education, and the world's need for innovativeness in science and technology the Nigerian government has started coming up with strategies on how to encourage STEM education (and very recently STEAM education) into the education system. The other policy framework is The National Science, Technology and Innovation Policy formulated in 2012 with three main development goals; one of which is to improve the quality of human capital through promotion of science and technology in all levels of education **(Federal Ministry of Science and Technology, 2012)**.

While the implementation of STEAM education is gradually advancing in Edo State through students' led organizations advocating for interdisciplinary approaches to learning. These are supported by partnerships between institutions and individual organizations as well as local government support in the educational technologies and curriculum acquisition among others. For example, in the case of EdoBEST (Edo Basic Education Sector Transformation) – these are government reform agenda that boosts basic education has directly impacted on making learning institutes more open to STEAM related activities even though the perception is more developed in the urban centers of Edo state **(Edo State Government, 2019)**. However, several constraints persist and prevent the comprehensive successful integration of STEAM education in Nigeria especially in Edo States which is still in their developmental stage in the reform of their education sector.

3. DIFFICULTIES OF INTEGRATION OF STEAM EDUCATION IN NIGERIAN SCHOOL

According to the stakeholders, one of the biggest challenges faced in Nigeria when it comes to implementing STEAM education is a paucity of adequately prepared teachers. Primary teachers lack knowledge on STEAM concepts and integrated curriculum and pedagogy and as a result cannot support students' creativity and innovative minds in classroom. Most teachers come to the classroom with normative content-based paradigms, and they have difficulty implementing STEAM's organized structure **(Shulman, 1986)**. Many studies reveal that teachers' knowledge of how to integrate art with STEM is central in steams, however; capacity building via professional development training of teachers in Nigeria is quite limited **(Popoola&Adeleke, 2018)**.

They stated that many schools especially the ones in Edo State, Nigeria lacked the necessary facility to support STEAM activities. The necessities such as laboratory facilities, computers, art materials, and steady internet

connection are inadequate; these are frequent scarcities for rural schools **(Bello, 2020)**. This is even the case given that most of the schools within urban areas are equipped with computers than schools in the rural areas which were inept thus aichieved to a large extend a widening gap on the delivery of quality STEM education in the country**(Aduwa-Ogiegbaen&Iyamu, 2005)**. This lack of resources is a problem experienced in the experiential and project based nature of STEAM education where the students shall be equipped with the tools and other essentials for the completion of a project.

Currently, the Nigeria curriculum is rigid, examination oriented, and national syllabi, and most countries have adopted the same pattern of curriculum organization; therefore, this leaves insufficient room for the exploration and integration that is inherent in STEAM education. Nigerian schools are mostly controlled with tight curriculum that has been put in place to facilitate the WASSCE or NECO exams. This kind of an approach puts lots of pressure to the teachers and students to cram so much content in little time that the aspect of creativity n problem solving is often limited. Consequently, the kind of intensive, project approach that STEAM fosters does not fit well in the current system and structures **(Ogunleye, 2009)**.

The last barrier is the fact that policymakers, educators, and parents are not well enough informed about the integral need for STEAM education. Though STEM subjects are known today to be important more than ever to the processes of economic development, the notion of applying arts into the STEM based disciplines is not fully understood. Lack of awareness of these issues will mean less lobbying for STEAM initiatives hence little provision for the same in policy and funding **(Akpan&Etim, 2015)**. Due to the lack of advocacy STEAM education campaigns receive less funding and are not considered within education agenda.

In addressing these issues, one requires a multifaceted handling of the issues that cuts across all the participants in the educational system. Teacher professional learning should be a strategic emphasis to prepare teachers to understand and apply principles of STEAM into classrooms. Further, expertise in education and construction of these structures is central in averting dusty learning environments augmented by school infrastructural development in the provision of accompanying implements vital for tangible learning environments. The curriculum must also be changed in a way that permits a larger measure of freedom in styles and methods of instruction, and more calls for public scarification can aid bring support for STEAM education from the government and business establishments of a society.

4. METHODOLOGY

This research work uses both the qualitative and the quantitative data collection and analysis approaches in order to draw an overall understanding on how STEAM education promote creativity and innovations among learners in Edo State. While the quantitative data collection method entails the use of standardized questionnaires among students and teachers the qualitative component entails use of in-depth interview among teachers and school officials.

The Population for the study consists of students and teachers in selected secondary schools in Edo State. Precisely, the study focuses on students from Secondary and Tertiary institutions who have been privileged to imparted, participate in, or influenced by, or engaged with, STEAM educative activities, and teachers from all disciplines who have a duty of implementing the STEAM Education Approach in training. In order to achieve a cross-sectional sample by education level, institution type, and gender, a stratified random sampling technique was used. The total sample population comprised 200 students and 50 teachers in 10 secondary schools in Edo State to gain a comprehensive understanding of how STEAM education fosters creativity and innovation among learners in Edo State. The quantitative component involves the use of structured questionnaires administered to students and teachers, while the qualitative component consists of semi-structured interviews with teachers and school administrators.

These questionnaires were in a form of quantitative based on students' perception of creativity, problem solving and innovations through STEAM. Likert type scale for the present study will be from strongly disagree = 1 to strongly agree = 5 for measuring the perceptions of the students and teachers. Face-to-face semi structured interviews were administered to the teachers and school administrators to get

quantitative data on their qualitative perspective of STEAM approach. Consequently, these interviews enabled probing of the difficulties, efficacious practices, and forwarded guidelines concerning STEAM. Feedback questionnaires was administered through a self-administered, self-complete, paper-pencil type questionnaire or an online site depending on the school's preference. Semi-structured interviews were planned for selected teachers and administrators either in hardcopy or through an online platform (depending on the school's preferences). Semi-structured interviews was scheduled with selected teachers and administrators. Both of these interviews were audiotaped and transcribed, and data analysis was conducted thematically. Before participation all participants were informed of the purpose of the study and signed a consent form. Participants anonymity and the confidentiality of their information were preserved as earlier described.

Frequency distribution data analysis technique that include the mean, median, and standard deviation were used to analyze the responses from the questionnaires. In addition Pearson's correlation test was also used with the view of determining the relationship between STEAM education and students' creativity / innovation. Texts of interview conducted were thematically coded to reveal the broad trends, patterns and issues surrounding teachers' implementation of STEAM. Themes were used in order to analyse educators' perceptions of innovation and creativity.

5. DATA ANALYSIS

The quantitative analysis is based on the responses from 200 students and 50 teachers across 10 schools. The data was analyzed using descriptive and inferential statistics, including means, standard deviations, and Pearson's correlation.

5.1 Demographic Information of Respondents

Table 1 below presents the demographic characteristics of the participants. The demographic variables include gender, educational level, and years of experience for teachers.

Table-1: Demographic Characteristics of Respondents

Variable	Frequency (n)	Percentage (%)
Gender		
Male	120	60%
Female	80	40%
Teaching Experience (Teachers)		
1–5 years	20	40%
6–10 years	15	30%
11–15 years	10	20%
16+ years	5	10%

- **Students' Perceptions of STEAM Education and Creativity:** The first research question was focused on discovering how STEAM education promotes creativity among the learners. With this, students were required to express their views on propositions regarding creativity and problem solving in STEAM environment. Table 2 below presents such response.

Table-2: Students' Perceptions of Creativity in STEAM Education

Statement	Mean	Standard Deviation
STEAM activities enhance my creativity in solving problems.	4.5	0.6
I enjoy working on interdisciplinary projects that combine arts and science.	4.3	0.8

STEAM education helps me think of multiple solutions to a problem.	4.6	0.5
STEAM encourages me to think outside the box.	4.7	0.4

The mean scores for all statements are above 4.0, indicating a strong agreement among students that STEAM education significantly contributes to their creative thinking and problem-solving abilities. Most students felt that integrating arts into science and technology subjects encouraged them to develop multiple solutions to problems, reflecting a heightened sense of creativity and innovation.

- **Relationship between STEAM Education and Problem-Solving Skills:** To investigate the relationship between STEAM education and students' problem-solving abilities, a Pearson's correlation analysis was conducted. The analysis revealed a strong positive correlation ($r = 0.82$, $p < 0.01$) between students' exposure to STEAM activities and their problem-solving skills. This suggests that students who actively engage in STEAM projects are more likely to develop critical thinking skills and approach problems innovatively.
- **Teachers' Perceptions of STEAM Education:** Teachers were asked to rate their views on the effectiveness of STEAM education in fostering creativity and innovation among students. Table 3 below shows the summary of responses.

Table-3: Teachers' Perceptions of STEAM Education

Statement	Mean	Standard Deviation
STEAM education enhances students' ability to think critically.	4.4	0.69
Interdisciplinary projects in STEAM improve students' creativity.	4.5	0.60
STEAM promotes innovation and problem-solving skills.	4.7	0.42
The STEAM approach makes learning more engaging for students.	4.3	0.84

Teachers overwhelmingly agreed that STEAM education is effective in fostering students' creativity and innovation. The mean scores indicate that teachers perceive STEAM as a beneficial approach that enhances critical thinking, problem-solving, and student engagement.

5.2 Qualitative Data Analysis

The qualitative data was collected through semi-structured interviews with 10 teachers and 5 school administrators. The interviews were transcribed, coded, and analyzed thematically. Three key themes emerged from the qualitative analysis: (1) the role of STEAM in fostering creativity, (2) challenges in implementing STEAM, and (3) strategies for improving STEAM education in Edo State.

- **Theme 1: Role of STEAM in Fostering Creativity:** In the interviews all participants shared similar opinion that STEAM education is as an essential part in the process of promoting creativity among students. The focus was made on how teachers enhance STEAM projects for students to be able to think through various creative ways of addressing certain issues. One teacher noted:

"When students immerse themselves in work within the context of STEAM projects, they start to change their mind set. They do not perform operations in a regular approach which is in your books and other sources of formative information but they find ways how to address those operations. One day they are not sure of anything and the next, they are having a different thought process all together."

Another teacher emphasized the importance of integrating arts into science and technology, stating:

The letter A for arts in the acronym STEAM is important. It makes students to consider problem in a number of different angles. They are

not just computing something, or designing an algorithm; they are envisioning how these solutions will run.

- **Theme 2: Challenges in Implementing STEAM Education:** The following were the challenges that were mentioned by the participants with regard to the practice of STEAM education in Edo State: The most commonly reported challenges included:

Lack of Resources: Most school do not have the resources that will enhance the offering of STEAM projects including computers, artwork and lab equipment.

Inadequate Teacher Training: Some of the teachers who were interviewed complained they had been trained on how to implement STEAM into their classroom lessons. One teacher remarked:

"More specifically, we require more professional development programs that will help us understand how to apply STEAM approaches in the class. , without training to do so it becomes difficult to effectively use the procedure properly.

Curriculum Constraints: Several teachers interviewed mentioned their fears about the structure of the national curriculum, which is dominated by examination. This makes it difficult to accommodate the project-based learning activities that are heart of STEAM.

- **Theme 3: Strategies for Improving STEAM Education:** Participants also identified the following strategies in surmounting the challenges with regard to effectiveness of STEAM education in Edo State. These include:
  - **Improving Teacher Training:** Some recommendations that most students provided included; The participants argued that, regular Teachers Professional Development on STEAM should be availed to the tutors. This would enable instructors to embark on the preparation of the planned multi professional learning.
  - **Providing Resources:** In case the schools want to support STEAM activities, they should have the appropriate equipment and materials. One administrator recommended:

Based on the survey results, the government should allocate most of its budget to STEAM projects. Schools require the aforementioned necessities – particularly technology and art, to support the function of these programs.

  - **Curriculum Flexibility:** Hearing from students, teachers, and administrators, the authors determined that the state government should promote a less Structures and Change -oriented curriculum that would accommodate projects and creativity rather than pushing knowledge for exams.

6. DISCUSSION OF FINDINGS

The findings from both quantitative and qualitative data indicate that STEAM education has a significant positive impact on fostering creativity and innovation among learners in Edo State. The high mean scores in both student and teacher responses show that STEAM activities are perceived to enhance critical thinking, creativity, and problem-solving skills. Furthermore, the strong positive correlation between STEAM exposure and problem-solving skills highlights the effectiveness of this approach in developing innovative thinkers.

However, the challenges identified, including inadequate resources and teacher training, point to the need for targeted interventions to ensure the successful implementation of STEAM education. The qualitative data also revealed that teachers and administrators are highly supportive of STEAM but require more support in terms of resources and professional development.

7. CONCLUSION

The findings of this study demonstrate that STEAM education has a significant positive impact on fostering creativity and innovation among learners in Edo State. Both students and teachers recognize the benefits of the STEAM approach, particularly its ability to enhance critical thinking, problem-solving, and creative exploration. However, the successful implementation of STEAM education is hindered by several challenges, including resource shortages, inadequate teacher training, and restrictive curricula.

Despite these challenges, there is strong support from educators for STEAM education, and many believe that with the right support and resources, it can significantly enhance educational outcomes. The integration of arts with science and technology subjects has proven to be a key driver

of innovation, helping students develop holistic problem-solving skills. Therefore, it is crucial that stakeholders invest in the necessary infrastructure and training to ensure that STEAM education is effectively implemented across schools in Edo State.

8. RECOMMENDATIONS

Based on the findings of this research, the following recommendations are made to enhance the implementation of STEAM education in Edo State:

8.1 For Policy Makers

- **Increase Funding for STEAM Resources:** Schools require additional resources for the procurement of equipment and materials required in the implementation of STEAM projects whereby stakeholders in this, particularly the government, should come up with additional means for allocation of funds for these program. These are include computers, the color and the paint used while drawing and painting and the test tubes, pipettes among other laboratory tools.
- **Incorporate STEAM in National and State Curricula:** The Ministry of Education should endeavour to formally include STEAM as part of the education system. This is going to enable not only more diverse approaches to learning, and more in classes that are focused on projects and that are team-taught across disciplines.

8.2 For Schools and Administrators:

- **Provide Continuous Professional Development for Teachers:** Schools should regularly organise professional development workshops that preparing teachers in STEAM based teaching. Teachers require assistance in maintaining their duties when it comes to incorporating interprofessional lessons and increasing creativity through technology.
- **Create STEAM Labs and Innovation Hubs:** Every school must be provided with special facilities for STEAM labs where students can practice more activities based on STEAM concepts. These spaces enable innovation, creativity and integration of the learners.

8.3 For Teachers

- **Promote Interdisciplinary Collaboration:** Teachers must be encouraged to interchange ideas, pull together Arts with Science, Technology and Engineering practices into classrooms. That will let students find relation between different fields and think qualitatively.
- **Use Project-Based Learning:** STEAM education feeds on student inquiry whereby students are presented with situations and develop proper solutions through practical projects. Teachers, therefore, should ensure that the tasks created for their learners will enable them solve some problem through project work and creativity.

9. LIMITATIONS OF THE STUDY

While this study provides valuable insights into the role of STEAM education in fostering creativity and innovation, there were several limitations:

- **Sample Size:** The study might be influenced by lack of adequate response from a large number of populated schools and participants in Edo state due to limited participation of the schools. The findings of this study should be used in future studies with a larger sample size and participants of different demographic background.
- **Short-Term Focus:** The paper mainly discussed on short-term impact of STEAM education on creativity and problem solving ability. Additional, it is proposed to conduct longitudinal research to define the effect of STEAM approach on students' success in further education and work.

10. CONTRIBUTION TO KNOWLEDGE

In addressing these questions, this study adds to the developing body of knowledge on STEAM education by demonstrating through the findings that implementing STEAM educational approach enhances the creativity and innovation of learners in a developing context. It shows how the work integrates faculty, language analyses, and logical reasoning into the educational process. In addition, this paper provides several practical

-implications to educationists, policymakers, and anyone else interested to promote quality education using STEAM in Edo State and other like regions.

REFERENCES

Akpan, B. B., &Etim, P. J. (2015). Science education reforms in Nigeria and the challenges of global competitiveness. Journal of Education and Practice, 6(9), 102-107.

Aduwa-Ogiegbaen, S. E., &Iyamu, E. O. S. (2005).Using information and communication technology in secondary schools in Nigeria: Problems and prospects.Educational Technology & Society, 8(1), 104-112.

Bello, T. (2020).Challenges of STEM and STEAM education in Nigeria.African Journal of Educational Studies in Mathematics and Sciences, 16(2), 85-94.

Bequette, J. W., &Bequette, M. B. (2012).A place for art and design education in the STEM conversation.Art Education, 65(2), 40-47.

Bell, S. (2010). Project-based learning for the 21st century: Skills for the future. The Clearing House: A Journal of Educational Strategies, Issues and Ideas, 83(2), 39-43.

Edo State Government. (2019). EdoBEST program: Empowering a new generation of students. Retrieved from [EdoBEST official website].

Federal Ministry of Science and Technology.(2012). National Science, Technology, and Innovation Policy.

Henriksen, D. (2014). Full STEAM ahead: Creativity in excellent STEM teaching practices.The STEAM Journal, 1(2), 15.

Land, M. H. (2013). Full STEAM ahead: The benefits of integrating the arts into STEM. Procedia Computer Science, 20, 547-552.

Maeda, J. (2013). STEM to STEAM: Art in K-12 is key to building a strong economy. Edutopia.

National Research Council. (2012). Education for life and work: Developing transferable knowledge and skills in the 21st century. National Academies Press.

Ogunleye, A. O. (2009). Curriculum development in science, technology, and mathematics (STM) education in Nigeria: Challenges and prospects. Journal of Science Teachers Association of Nigeria, 44 (1&2), 109-120.

Popoola, A. A., &Adeleke, J. O. (2018). Teacher education and STEAM: A case for Nigeria. International Journal of Educational Research, 6(2), 45-56.

Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. Educational Researcher, 15(2), 4-14.

World Economic Forum. (2016). *The future of jobs: Employment, skills, and workforce strategy for the Fourth Industrial Revolution*.

Yakman, G. (2010). STEAM education: An overview of creating a model of integrative education. PATT-22 Conference Proceedings.

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