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School Management Strategies and Lifelong Skills Acquisition among STEM Students in Public Secondary Schools

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ABSTRACT

This correlational study investigated the relationship between school managers' approaches and lifelong skills acquisition among STEM students in Public secondary schools in Awka South LGA of Anambra State. The aim was to determine whether school leaders' strategies in curriculum design, developing extracurricular activities and establishing partnerships with external bodies could affect lifelong skills acquisition among STEM students. Findings revealed a moderate positive relationship between school managers' approaches and lifelong skills acquisition of STEM students. The positive relationship suggests that curriculum design and lifelong skills acquisition are interrelated. The study concludes that integrating life skills into the curriculum and enriching curriculum contents with current realities will help students acquire the needed skills for the future.

Keywords: curriculum design, extracurricular activities, partnership, professional development, school managers approaches, STEM students

INTRODUCTION

Any meaningful society desires to see a greater segment of its population fully involved in ventures that will lead to its development and growth by increasing the income generation of its people. This has accounted for the reasons why the

government introduced diverse empowerment strategies in Nigeria such as the National Directorate of Employment (NDE), the National Poverty Eradication Programme (NAPEP), and others in its reform strategy. These agencies according to Adebisi, Aderonke, Saibu, & Olusegun (2013) are saddled with the primary responsibility of organizing quality programmes that are necessary for poverty reduction and the enhancement of quality living through education. Quality education, which is aligned with the needs of the contemporary economy is known to drive economic development (Pal, 2023). It is also a channel through which individuals can be empowered and equipped to be useful citizens.

STEM education in particular is an interdisciplinary learning approach that integrates science, technology, engineering, math, and skills into the learning process; it has contributed immensely to developing students' problem-solving, critical thinking, and analytical skills (Maryland State STEM Standard of Practice, 2015; Ntsanwisi, 2024). These skills are vital for a successful future, especially in the era of increased globalization of science and technology where the possession of specific skills is essential (Chisom et al, 2024). Scholars agree that STEM will drive innovations across disciplines by using computational power to accelerate discoveries (National Science Foundation, 2020). Hence, schools are required to carefully select educational methodologies and curricula to increase competitiveness in the field of science and technology (Savkov, et al., 2020). The benefit of STEM education is that it encourages students to solve real social, economic, and environmental problems through the development of research competence, cooperation, collaboration, communication, and creative skills (Savkov et al., 2020).

The above statement conforms with the noble objectives of education in Nigeria as outlined in the National Policy on Education. These objectives include the acquisition of appropriate skills, multidimensional competencies, and abilities for self-reliance and societal development, as well as the development of proper values and intellectual capabilities (Federal Republic of Nigeria, 2014). Invariably, education prepares students for the challenges of life, empowering them to appreciate their environment and make informed decisions for personal and societal benefits. In this case, science education is the engine of control, fostering awareness among individuals and propelling the country into technological growth. Ukpene (2011) added that science and technology education is prepared to teach skills acquisition that will enhance self-reliance and sustainable livelihoods.

There is a pressing concern about how to grow a domestic STEM workforce in an era where science and technology permeate the economy (National Science Foundation, 2020). A visionary report by the National Science Foundation noted a lack of interest among United States youth in pursuing STEM careers and the urgent need to develop STEM talent that the US needs for the future if they are to maintain their global leadership in technological innovation (National Science

Foundation, 2020). Likewise, the Federal Ministry of Education in Nigeria in its implementation policy on science and technology education noted that the role of science and technology is central to industrial development and observed a growing disconnect between the demand for skills and talent in the Nigerian economy, which is a threat to job prospects and the prosperity of the country (Federal Ministry of Education, 2019). The implementation policy stipulates a plan to improve the quality of STEM education at all levels of the educational system to develop appropriate skills for students (FME, 2019).

The main purpose of this study was to determine the relationship between school managers' approaches and long-term skills acquisition in public secondary schools in Awka South LGA.

LITERATURE REVIEW

Lifelong skills acquisition is defined as all purposeful learning activities undertaken on an ongoing basis to improve knowledge, skills, and competency, and the learning is continuous or throughout life (UNESCO, 2023). It is about acquiring and updating a wide range of abilities, and knowledge from kindergarten to retirement promoting the development of knowledge and competencies needed to adapt to a knowledge-based society (Kaur, 2017). It covers all aspects of schools both formal and nonformal and a key to employability (Maclean & Power, 2012). Lifelong skills involve keeping students engaged in learning, and developing attributes that make learning an integral part of their lives when they leave school (Bryce & Withex, 2003). It helps develop autonomy and a sense of responsibility for students and reinforces their capacity to deal with the transformations taking place in the economy (Power and Maclean, 2012). STEM education helps students develop life skills such as fostering creativity and innovation through interactions with engineering and technology lessons; moreover, they develop adaptability and resilience; technological fluency and financial literacy through math applications (Chiangpradit, 2024). The impact and importance of STEM education extends far beyond the classroom and fosters lifelong learning (Chiangpradit, 2024).

Skills that can be fostered through STEM education include engineering-based problem-solving skills, association skills, engineering-based design skills, innovation, digital competence, creativity, communication, and collaboration (Sen et al., 2019). McGraw-Hill Education & Ennis (2018) identified 21st-century skills as critical thinking, creativity, communication, collaboration, and character qualities that incorporate curiosity, initiative, persistence, adaptability, leadership, and social-cultural awareness. Skills are the ability to perform activities competently. It is widely regarded as the focus of analytical research and as a core object for policy interventions in the modern global high-technology era. Asodike (2015) described skills as the ability that theoretical training alone cannot provide or account for.

Invariably, life-long skills are competencies and personal skills an individual acquires on a particular job that can help people make decisions, communicate effectively with others, and develop knowledge and skills related to the progress and success of the individual (Bala etal., 2024). The ability of STEM students to possess life-sustaining essentials, be a person, and gain freedom are described in the economic development literature as core values of sustainable development. In line with the above views, McGarrah (2015) noted that life-long skills help STEM students build confidence in both communication and collaboration; and provide them with tools essential for developing and finding new ways of thinking and problem-solving. It provides methods for socializing, making new friends, and recognizing the impact of their actions and behaviors on others. Lifelong learning skills enable individuals to acquire skills, capabilities, and qualifications to become active members of labor markets and society. To facilitate the attainment of these skills among STEM students, school managers play significant roles in developing approaches to design and redesign curriculum content, school extracurricular activities, teachers' professional development, engaging partners and collaborating with members of external communities to foster the development of lifelong skills among STEM students.

School management approaches are operationalized as the particular inclination adopted by principals in instilling lifelong skills in students. The principal works with the teachers, students, and supervisors in the selection of appropriate curricula, and work schedules that integrate lifelong skills (Okoroma, 2007). The curriculum should be improved to new realities through adjustments that do not affect its structure but rather prepare students for living in a changing world (Thanavathi et al., 2020). School administrators can ensure that STEM subjects are integrated cohesively into the curriculum, emphasizing critical thinking, problem-solving, and practical application of knowledge (Chakra & Lavanya, 2024). An integrated curriculum is the same as interdisciplinary curriculum because it brings two or more disciplines together and provides opportunities for skills to be taught across subject areas, creating more opportunities for students to acquire knowledge across disciplines. (Pountney, & Mcphail, 2017). It is actually an effective way to teach 21st century capabilities and boost academic achievement (Drake & Reid, 2018).

Another strategy is developing extracurricular activities that offer children the opportunity to learn new skills, develop character, and build life-long friendships as well as instill essential life skills and values (Stella Maris School, 2022). Activities that incorporate discipline, teamwork, public speaking, confidence, leadership, and time management should not be left out (Stella Maris School, 2022). Encouraging and supporting STEM-related clubs, competitions, and projects can provide students with hands-on experience and opportunities to develop teamwork, leadership, and perseverance.

In addition, a shift in the teaching and learning approach could help students acquire novel skills; emphasis should be placed on the group-based project approach which enhances the development of technical and nontechnical skills (Duffy & Bowe, 2010). Equally, learning focusing on inquiry, generating ideas, analyzing information and reflecting on information (Drake & Reid, 2018). School administrators can invest in ongoing training and development for teachers to increase their STEM teaching skills, ensuring that they are equipped to inspire and guide students effectively. Professional development could include in-service training, workshops, planned opportunities for professional growth, and self-directed teachers' professional development (Kaur, 2017). Professional development should also focus on teaching styles, inclusive teaching strategies, and diversity.

Another approach is school managers' adherence to establishing partnerships with private businessmen, religious groups, nongovernmental agencies, financial institutions, industries, universities, and research institutions located in their communities to provide students with mentorship, internships, and exposure to real-world applications of lifelong skills (Ezugoh & Adesina, 2020). The partnership could involve services, internships, fundraising, networking, collaboration among schools and opportunities for healthy competition (Ayano, 2023). Partnerships and collaboration can reduce operational expenses because they balance the costs between both organizations; this balance might include training, a shared workspace, and transportation (Luthra, 2024). School partnerships are a vehicle for experiential and relevant lifelong learning that provides opportunities to continually learn and improve (Luthra, 2024). By implementing the aforementioned approaches, school administrators can cultivate a culture of lifelong skills acquisition among STEM secondary school students, preparing them for future academic and professional success in STEM fields.

There is a pressing need for a STEM workforce in an era where science and technology are the foundations of a thriving innovative economy. This is because STEM subjects are essential for development and offer interdisciplinary, hands-on practical experiences and prepare students for the transformation that takes place in all subsectors of society. It is believed that STEM graduates play important roles in building the economy and developing the country through their knowledge of science, technology engineering, and math. Additionally, they are required to acquire key skills such as creativity, critical thinking, communication, and interpersonal skills (Portillo-Blanco et al., 2024). This requirement has increased the demand for STEM education to meet the needs of globalization (Oyeniran, 2023).

However, a disconnect has been identified between what STEM students learn in school and the lifelong skills needed for a thriving economy. This indicates a gap in curriculum design and content. This means that graduate and school leavers lack the skills required to be employable or even to be self-reliant

after graduation. At this point, the study suggests that the labor market is highly competitive and that ill-equipped graduate students will not have a chance. It is no longer news that many employers value, technical, and soft skills more than paper certificates do. Hence, there is a need for proper alignment of the curriculum for the acquisition of lifelong skills. This study aims to investigate school managers' approaches and the acquisition of lifelong skills among STEM students in public secondary schools in Awka South LGA. The findings of this study provide new knowledge to school leaders, including knowledge of approaches to integrate lifelong skills into the curriculum. It creates awareness of the technical and soft skills required for life-long learning. It also provides a framework for planning the implementation of interdisciplinary-based curricula in public schools.

RESEARCH METHOD

The study adopted a correlational design to gain a deeper understanding of the variables under study. The population of the study consists of all the public secondary school teachers in Awka South LGA, a total of 624. A simple random sampling technique was used to select 40 teachers for the study. This number was chosen because it reflects the limit of the researchers' budget. Two sets of questionnaires were used. Section 1 contains 24 descriptive statements designed by the researchers to elicit responses from teachers and it is titled the "School Managers' approaches questionnaire" (SMAQ).

Section 2 contains 20 items and is titled the Lifelong Skills Acquisition for STEM Students Questionnaire (LSASSQ). The responses were based on a 4-point modified Likert scale of 4- strongly agreed (SA); 3- agreed (A); 2-disagreed (D); 1- strongly disagreed (SD). The respondents for both instruments were teachers. The instrument was validated by three experts in educational management, measurement and evaluation and science education. Cronbach's alpha was used to measure the internal consistency of the instrument, and the instrument was examined to accentuate whether it measures what it purports to measure. Trial testing of the instrument was performed in Enugu State with 10 teachers purposively selected from public secondary schools in Enugu State. This shows that they have features similar to those of the studied group (public secondary school). The overall reliability was 0.82. The data collected were analyzed via bivariate correlation analysis.

The following research questions guided the study:

1. What is the relationship between school managers' curriculum design approaches and lifelong skills acquisition in public secondary schools in Awka South LGA?

2. What is the relationship between school managers' extracurricular activities and lifelong skills acquisition in public secondary schools in Awka South LGA?
3. What is the relationship between school managers' professional development approaches and lifelong skills acquisition in public secondary schools in Awka South LGA?
4. What is the relationship between school managers' partnership relationships and lifelong skills acquisition in public secondary schools in Awka South LGA?

RESULTS

This section presents the results of the study. Table 1 provides the correlation analysis of responses on the relationship between curriculum design and lifelong skills acquisition of STEM students.

Research Question 1: What is the relationship between school managers' curriculum design approaches and lifelong skills acquisition in public secondary schools in Awka South LGA?

Table 1

Correlation Analysis of Responses on the Relationship between Curriculum Design and Lifelong Skills Acquisition

Variable	*N*	*R*	*P*
Lifelong skills	40	.642**	.000

** *The correlation is significant at the 0.01 level (2-tailed).*

Table 1 shows that the relationship between school managers' curriculum design and lifelong skills acquisition was statistically significant ($r = .642$, $p = .000$). This means that there is a moderate and positive relationship between school managers' curriculum design and the lifelong skills acquisition of STEM students in public secondary schools in Awka South LGA.

Research Question 2: What is the relationship between school managers' extracurricular activities and lifelong skills acquisition in public secondary schools in Awka South LGA?

Table 2

Correlation Analysis of Responses on the Relationship between Extracurricular Activities and Life-Long Skills Acquisition

Variable	*N*	*R*	*P*
Lifelong skills	40	.621**	.000

** The *Correlation is significant at the 0.01 level (2-tailed).*

Table 2 shows that the relationship between school managers' extra-curricular activities and lifelong skills acquisition was statistically significant (r = .641, p = .000). This means that there is a moderate and positive relationship between school managers' extracurricular activities and the lifelong skills acquisition among STEM students in public secondary schools in public secondary schools in Awka South LGA

Research Question 3: What is the relationship between school managers' professional development approaches and lifelong skills acquisition in public secondary schools in Akwa South LGA?

Table 3

Correlation Analysis of Responses on the Relationship between School Managers' Professional Development and Life-Long Skills Acquisition

Variable	*N*	*R*	*P*
Lifelong skills	40	.782**	.000

** *The Correlation is significant at the 0.01 level (2-tailed).*

Table 3 shows that the relationship between school managers' professional development and lifelong skills acquisition was statistically significant (r = .782, p = .000). This means that a moderate and positive relationship exists between school managers' professional development approaches and lifelong skills acquisition among STEM students in Awka South LGA.

Research Question 4: What is the relationship between school managers' partnership and lifelong skills acquisition in public secondary schools in Awka South LGA?

Table 4

Correlation Analysis of Responses on the Relationship between School Partnership and Life-Long Skills Acquisition

Variable	*N*	*R*	*p*
Lifelong skills	40	.622**	.000

** *The Correlation is significant at the 0.01 level (2-tailed).*

Table 4 shows that the relationship between school managers' partnerships and lifelong skills acquisition among STEM students was statistically significant (r = .622, p = .000). This means that a moderate and positive relationship exists between school managers' partnerships with external agencies and lifelong acquisition skills among STEM students in Awka South LGA.

DISCUSSION AND CONCLUSIONS

Table 1 revealed a moderately significant positive relationship between school managers' curriculum design and STEM students' lifelong skills acquisition (r = .642). This means that school managers' curriculum design could significantly improve lifelong skills acquisition among STEM students. These findings are in tandem with the observations of Thanavathi (et al., 2020) who noted that improving curricula with national demands and new realities will help students live in a changing world. This finding calls for the integration of STEM curriculum across disciplines to enable students acquire broad knowledge for solving emerging problems and discovering problems (Coutts, 2016). Schools need to redesign curricular to suit current trends worldwide. The curriculum should also accommodate the skills that are in high demand at the moment. Moreover, the rapid advancement of globalization in the economy demands the acquisition of multiple skills to remain relevant in the global space (Offiah, 2017).

These findings imply that schools should embed life skills in the curriculum from preschool to university to enable students develop the ability to participate in solving problems for life and work (Aluko, 2022). The positive relationship suggests that curriculum design and lifelong skills acquisition among STEM students change in the same direction. An improvement in one means improvement in the other.

Table 2 indicates a moderate and positive relationship between extracurricular activities and lifelong skills acquisition (r = .782, p = .000). The findings agree with the observations of Stella Maris School (2022) who posited that activities that incorporate discipline, teamwork, public speaking, confidence, leadership, and time management could instil lifelong skills in students. Other curriculum activities, such as clubs, external competitions, such as Olympiad,

Cowbell, and the Mathematical Association of Nigeria (MAN); InterswitchSPAK competitions: religious group meetings; and recreation activities help students develop their abilities in preparation for the outside world (Oyeniran, 2023).

These activities help students develop social skills and be creative. Clubs such as writers' clubs help one express themselves in literary works, and recreational activities teach STEM students the need to maintain a healthy body by engaging in sports and exercise. Religious activities also help foster good relationships with God and man. Instilling a culture of creativity through extracurricular activities from an early age will unleash a culture of innovation, resilience, risk-taking and problem solving in students (National Science Foundation, 2020).

Table 3 reveals a moderate and positive relationship between professional development and lifelong skill acquisition in STEM students ($r = .641$, $p = .000$). These findings are in agreement with Duffy and Bowe (2010), who insisted that professional development should be used to change the teaching and learning approach; emphasis should be placed on training teachers to master how to use a group-based project approach, which enhances the development of technical and non-technical skills in learners. Through professional development and training, teachers gain insight into how to use specific strategies to enhance students' learning that will lead to their development of required skills.

Table 4 also indicates a moderate positive relationship between partnership with external bodies and lifelong skills acquisition in STEM students ($r = .622$, $p = .000$). The findings are in agreement with those of Luthra (2024), who postulated that school partnership with external bodies is a vehicle for experiential and relevant lifelong learning. Partnerships with companies and private firms provide students with opportunities for mentorship and internships that expose students to real world applications of STEM skills. For example Jesuit Memorial College urges their STEM students to pursue internship programs in different fields to develop various skills that will be very useful later in life. The reflection of a particular student revealed how she acquired technical skills and made contacts during her internship project (Ayano, 2023). The school also partnered with orphanage homes, motherless baby homes and older people's homes to organize service projects for their students to help them learn to serve others and return to society (Obidike, 2020).

Research reveals that school managers' curriculum content, extracurricular activities, professional development and partnerships with external bodies are significantly related to STEM students' acquisition of lifelong skills. The study concludes that integrating lifelong skills into the curriculum and enriching curriculum content with current realities will help students acquire the skills needed for the future. Partnering with external bodies and industries will provide avenues for STEM students to gain hands-on experience that will provide the nuances and protocols required in their desired careers. Professional

development will equip teachers with the strategies needed to effectively integrate lifelong skills in teaching and learning activities in schools.

IMPLICATIONS

Lifelong skills enable individuals to acquire the capabilities and qualifications necessary to become active members of the labor market and society. These skills increase students' chances of future employment and provide the self-confidence needed for personal development. To facilitate the attainment of these skills among STEM students, school managers play a crucial role in developing and redesigning curriculum content and extracurricular activities to foster the development of lifelong skills.

The positive relationship revealed in this study implies that schools should embed life skills in the curriculum from preschool through university to enable students develop the ability to address problems in life and work (Aluko, 2022). This positive relationship suggests that curriculum design and lifelong skills acquisition among STEM students are interrelated: an improvement in one leads to an improvement in the other. Hence, there is a need for school managers and teachers to design the curriculum purposefully, enriching it with skills that prepare students for life in a technologically advancing world. Efforts should be tailored to designing effective professional development programs that prepare and expose teachers to effective techniques for integrating soft skills into teaching approaches. This study is not without limitations, the small sample size may limit the generalizability of the findings and relying entirely on quantitative data may not provide in-depth insights into the opinions of the school managers regarding lifelong skills acquisition among STEM students. Future studies could focus on larger samples and incorporate qualitative research for more comprehensive data.

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