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Influence of STEM Approach for English Language Teaching and Learning

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ABSTRACT

With the recent digitalization across the globe, there is virtually no sector of education without the emergence/ usage of technology. Science, technology, engineering and mathematics (STEM) have no doubt turn the world of education into a cozy environment. STEM education has proven to be an avenue in different fields for creativity, critical thinking, problem-solving and also increases academic achievement and retention of what is; of which Language learning is not exempted. Language learning and STEM education are synonymous in the sense that the use of technological approach in Language laboratory has proven that it makes learning of Language for students easier, more accessible and more retentive. Language teachers have been benefitted from the use of technological approach in diverse ways ranging from wed seminar, zoom teachings and online conferences. This systematic review analyzed peer-reviewed studies (2013–2023) on STEM integration in English language teaching, sourced from major databases. Using thematic analysis, it synthesized evidence on technological tools, pedagogical strategies, learner outcomes, and teacher capacity building. Findings from the study revealed that STEM approach and Language learning are undeniable fact. The influence of STEM approach on Language learning makes learning of Language effective and efficient for both the Language teachers and the students. Based on the findings, the following recommendations were made that government and other stakeholders should make STEM education an upskill venture and compulsory for teaching of language in our schools.

Keywords:
STEM, Education, English Language, Teaching, Learning.

INTRODUCTION

Language may be seen as the human capacity for acquiring and using complex systems of communication and human language is modality(independent). Hence, it is considered the most powerful tool to mediate people's connection. Education is a style in which many factors such as cognitive skills, readiness level, cultural characteristics and environment are effective (Sengul et al, 2015). Language evolve and diversify over time and the history of their evolution can be reconstructed by comparism with technology for facilitation of learning processes in the classroom situation. The application and integration of technologies in many areas of education is gaining popularity (Banihashem, 2022). The use of internet and the world wide web, new learning opportunities arise.

In this way, teaching and learning styles develop and changes is required to adopt to these new practices. The use of information technologies in Language education has become more prominent as an effect of the rapid changes in educational technology (Seitenova et al,2023). It offers a wide variety of resources for the students to search for and access original materials for learning. When these approaches and methods are applied to language learning, it is difficult for

teachers to ignore mobile technologies that have played increasingly important roles in language learning. Language learning has an important place in terms of permanent knowledge, lesson motivation and versatile development. In Language education, the audio-visual method aims to teach skills in the areas of listening, speaking, reading and writing. Therefore, we can say that STEM – based teaching is a continuation of the audio-visual method (Seitenova et al, 2023).

It is pertinent to note that one of the important elements of Language learning is the methods used by the teachers to carry out language learning processes successfully. The use of technology especially information and communication technologies offer serious opportunities for language teachings. As in many areas of education, the use of technology naturally affects the change in the methods and processes of Language teaching (Ahmadi, 2018). Technological developments have brought many innovations, not only making life easier for human beings, but also revolutionizing their lives. One of these innovations is virtual reality. There is no gain-saying that STEM in language teaching saves time, provide motivation and efficiency and is more economically feasible and stands out as a useful tool in these respects. It is known that the adaptations of advanced technological tools with new constructive learning activities such as peer learning are crucial in learning (Latifi et al, 2020). Technological tools are needed more in Language teaching than in other branches of social sciences. There is dire need to create sounds and images that will appeal to the learners/ speakers of the language to be taught and to use them as course materials. In the field of education, the use of technology in language teaching is becoming preferable.

Language no doubt is the meeting point between STEM and communication. STEM has to be communicated through language and language is a system and vehicle of communication. It is an integral part of thought. Language is considered a critical resource in all human endeavours, especially in the educative process and this supports the view that language is a resource human beings use in the configurative and organization of their experience as well as in building information, attitudes, ideas or point of view. It has been equally observed that students and teachers consented that science should be taught to Nigerian students in Nigeria and so this was considered as a veritable solution to students' underperformance in science. In parallel with the developments in the technological fields, many developments have occurred in the fields of educational technologies. Language teaching is also included in the areas where educational technologies are frequently used. When compared with traditional teaching methods and techniques, it is known that the use of technological course materials in foreign language teaching has an important place in terms of permanent knowledge, lesson motivation and versatile development, (Kessler, 2018). In the teaching process, emphasis was placed on sound and image, ear and eye. Therefore, we can say that STEM – based teaching is a continuation of the audio-visual method. Thus, the continuity of the search for Language learning also necessitates the use of technology in language teaching.

STEM learning in English has gained importance over the last two decades due to the rising popularity of the content- based methods. It is all about communicating ideas and communicating STEM involves imparting, transferring or putting across ideas, concepts, skills, values and body of knowledge of STEM specifically from the teachers to the learners. STEM education has been realized as a main driver to support the technology driven future, (Bybee, 2013). Through STEM learning experiences, students are prepared for the global economy of the 21st century. The concept of STEM education emerged from the need for citizens who will contribute to their country economically and scientifically in the new information age we live in. During childhood and adolescences, individuals are curious and eager to explore the world around them and are active learners, creators and inquirers just like the scientists. It is therefore important to provide them with the resources and opportunities to explore, investigates and develop their innate abilities which traditional formal education can limit their interests and negatively affect their attitudes towards learning.

In the context of this study, as long as the search for language teaching continues especially the English Language, the use of technological inventions will always be in question (Tytarenko et al, 2021). Hence, the technology verbal strategy connotes interactions between the teacher

and the learners through the use of technical devices such as tape recorder, telephone, filmstrips, projectors, radio, televisions etc. The most important differences of STEM education are that it makes mathematics, science, engineering, art and design integral part of the education model in addition to language education. In this study, mathematics, science, engineering, arts and design education are considered as an integral holistic language education. Hence, there are two different approaches to how to integrate technology use with language learning processes. In the first approach, the cognitive approach, the students can shape their knowledge repertoire by making their interactions with language more intense and meaningful. According to the social approach, which represents the second view, students should be provided with quality social interactions and collaboration opportunities to develop real life skills (Andriani et al, 2021). Thus, STEM –based strategies include very rich stimuli, involves children's language use in their daily lives and are equally effective in the realization of learning tasks which are effective in the development of students' skills. It is paramount to note that STEM and computer-assisted language teaching increases students' motivation, attitudes and achievement.

METHOD

This study adopted a systematic review approach to examine the influence of the STEM approach on English language teaching and learning. The review focused on identifying, evaluating, and synthesizing relevant empirical and theoretical literature on STEM integration in language education. Electronic searches were conducted in major academic databases, including Google Scholar, ResearchGate, ERIC, and ScienceDirect, using keywords such as STEM education, English language teaching, technology in language learning, and computer-assisted language instruction. The search covered publications from 2013 to 2023 to ensure the inclusion of contemporary perspectives aligned with recent technological advancements. Inclusion criteria required that studies be peer-reviewed, published in English, and directly address STEM strategies in language learning contexts. Both qualitative and quantitative studies were considered, while non-academic sources, opinion pieces, and studies unrelated to English language education were excluded. Data extraction involved recording key information from each source, including author(s), year of publication, study context, methodology, main findings, and relevance to STEM-based language learning. Thematic analysis was applied to synthesize findings, grouping evidence into recurring themes such as technological tools, pedagogical strategies, learner outcomes, and teacher capacity building.

RESULT AND DISCUSSION

Stem -Based Activities in English Language Learning

STEM is an acronym for science, technology, engineering and mathematics education. It is an interdisciplinary approach that helps students succeed in colleges and in their future careers. The focus of STEM education is hands-on and problem- based learning. The basis of STEM education is to bring real life problems to educational environment and to offer various solutions (Kaban, 2021). STEM is equally an approach and provides opportunities for students to learn new concepts and skills more meaningfully by integrating concepts and skills from different STEM fields and applying them to real-life problems or event (Wilson et al, 2022). In the context of this study, it is thought that the use of STEM approach in lessons will increase students' creativity and self-confidence by doing, experiencing, exploring and discovering (Luo et al, 2019).

The relationship between English Language teaching and STEM education cannot be denied. Both are interwoven in the sense that the world of technology is gradually creeping every facet of education of which Language teaching is not exempted. The use of technologies in English language teaching has brought new dynamism in the field of language. The use of technology has also proven to be instrumental in individualized instruction. In individualized teaching, STEM has made language teaching more effective by increasing students' retention. In consonance, Tytarenko et al (2021) concurred that STEM practices aided in the teaching of English education for the students. Makoe et al (2018) equally designed an application for English that makes the

use of a "daily usage" feature that motivates students to come back every day, making it a habit in the process.

Research Implications

The findings of this study highlight the transformative potential of STEM-based approaches in English language teaching, suggesting that integrating technology, problem-solving, and interdisciplinary methods enhances learners' motivation, retention, and critical thinking. For educators, it underscores the need to adopt innovative, technology-driven strategies that align with 21st-century skills. Policymakers and curriculum developers are encouraged to embed STEM principles into language education frameworks to foster interactive, student-centered learning environments. Furthermore, teacher training programs should prioritize STEM integration to build pedagogical competence. Future research should explore context-specific STEM applications in language learning, especially in resource-limited settings, to ensure equitable and sustainable outcomes.

Future Research Directions

1. Investigate the long-term impact of STEM-based strategies on English language proficiency across diverse educational contexts.
2. Explore cost-effective, context-specific STEM tools for language teaching in resource-constrained environments.

CONCLUSION

STEM approach changes the attitudes of teaching English in the classroom. It offers a wide range of innovations and inventions in the field of education. In language teaching, STEM approach has increases students' creativity, writing, communication, presentation, cognitive higher-order thinking capacity, perspective development, critical thinking, skills and students' motivation. STEM provides students in language class with interactive and student-centered friendly environment where they explore the activities of the learning process. Based on the findings, the following recommendations were made: Government should make STEM education compulsory in all schools for easy accessibility and retention of students' learning processes. Stakeholders should create environments in schools where students and English language teachers can make effective use of technological and STEM opportunities in their extracurricular time. School Administrators should make room for adequate inculcation of teachers' and students' skills, knowledge and motivation through STEM environment in the schools.

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