DISRUPTIVE INNOVATION INDICES AND INSTITUTIONAL EFFECTIVENESS IN PUBLIC SECONDARY SCHOOLS IN LAGOS STATE, NIGERIA

BY

Yetunde Bukola Abolarin*[1], S. A. Bello[2] & E. E. Oshionebo[3].: Department of Educational Management, Faculty of Education, University of Lagos, Akoka, Nigeria
***Correspondence Author: abolarinyetunde79@gmail.com**

Abstract
This paper investigated disruptive innovation indices and institutional effectiveness in public secondary schools in Lagos State, Nigeria. The study employed correlational survey research design. The sample size for the study was 2,944 respondents, comprising 2,693 teachers and 251 principals in the randomly selected secondary schools in Lagos State. The research instruments used for collection of data were questionnaires. Three research hypotheses guided the study. The data collected were analysed using mean, standard deviation and Pearson Product Moment Correlation Coefficient at 0.05 level of significance. The findings revealed that: there was a significant relationship between disruptive innovation acceptability and institutional effectiveness in Lagos State public secondary schools; positive, but insignificant relationship existed between disruptive innovation accessibility and institutional effectiveness in Lagos State public secondary schools; and there was a significant relationship between disruptive innovation sustainability and institutional effectiveness in Lagos State public secondary schools. It was concluded based on the findings of the study that there was correlation between disruptive innovation indices and institutional effectiveness in public secondary schools in Lagos State, Nigeria. The study recommended, among others, that government should provide necessary innovative technology which can aid institutional effectiveness for use in secondary schools; and teachers and principals should always adopt innovative practices in the course of carrying out their duties in secondary schools.

Keywords: *Disruptive Innovation, Acceptability, Accessibility, Sustainability, Effectiveness, Public secondary schools*

Introduction
Educational institutions are saddled with the responsibilities of providing education for learners of different ages. These institutions are the major environments where knowledge is generated in form of information which is employed for identification of new ideas, norms, rules and standards aimed towards particular goals in an engaging manner for improved living of individual or group of people in a society. Secondary education is a six year programme received immediately after primary school with the aim of preparing students for further studies in higher institutions, preparedness for employment and contributions to national development through payment of taxes and job creations like painting, graphic design, coding, craft and other skills oriented jobs. However, this goal of secondary education makes expectation of total child development remains questionable with the current level of effectiveness in the public secondary schools in Lagos State.

Chuktu (2021) viewed institutional effectiveness as the degree to which an institution is meeting its stated mission. This description of an effective school takes constant evaluation of educational process and results as yardsticks for decision making and policy formulation. Institutional effectiveness serves as a basis for measuring performance in any institution. Institutional effectiveness is the ability to achieve goals and objectives of an organisation with appropriate use of available minimum resources. It is the procedure of ascertaining and reviewing performance of an organisation for the purpose of improvement and cost management. Measuring the level of institutional effectiveness of secondary education has to do with its influence on the recipient which includes learning outcomes both academic and skill for service rendering, product provision and preparedness for higher education. This relates to actualisation of the goals for establishing public secondary schools. Goal actualisation goes beyond

mission assessment based on monitoring and improvement of all aspects of the system through data gathering and analysis of students' results staff performance and decision making on accomplished task. It also includes quality education with provision of infrastructure, policies, personnel, appropriate method of teaching and inclusiveness.

Institutional effectiveness is pivotal to the functioning of an academic institution. Kareem (2019) identified four key approaches for measurement of institutional effectiveness. These are: goal approach; system resource approach; strategic constituency approach; and competing values approach. Goal approach is based on a criteria for measuring effectiveness. This approach focuses on the objectives that the organization is trying to achieve and an attempt to guess the extent to which these goals are achieved (Lee, 2006). Also, system resource approach focuses on the organization's ability to exploit its environment to obtain scarce and valuable resources, for the purpose of using it effectively to achieve the goals set and to maintain balance and stability (Kareem, 2019). Effectiveness of the organization in this approach is primarily related to the extent to which that organization is able to obtain or to attract the necessary resources to ensure its sustainability and maintain its survival. Similarly, competing values approach which is another criteria for measuring effectiveness and it assumes effectiveness to be based on individual personal values and interest (Kareem, 2019). This approach assumes that people within an institution have goals which may be based on their personal preferences, values and interests; which make it difficulty to arrive at a consensus on which goals should take precedence over others.

Disruptive innovation can be considered as the process of redefining existing product, services and the process of delivery for effective usage by the end user. It usually involves adoption of technology to make change in the process of services production and delivery with the aim of improving the efficiency and effectiveness of an institution and its operation. Disruptive innovation is a process which requires adoption of new methods or practices in performing a task which will bring about effectiveness and efficiency (Kelly, Jo, Eweje & Scott, 2017). It involves shifting from the conventional process of performing tasks to adoption of technological process by any institution. Technology according to Tikku and Singh (2019), acts as a gateway for innovation giving rise to gamut of new product and services, which improve productivity of an organisation. The adoption of innovative practices within an institution gives the institution a competitive advantage over others where innovative practices are not adopted. Supporting this view, Taeihagh (2023) asserted that disruptive technologies have the potential to increase efficiency, productivity, and convenience, promising a surge in economic growth, innovation, and accessibility. This implies that disruptive innovation may help the education sector to improve their efficiency and productivity.

Institutional effectiveness may be achieved with the adoption of disruptive innovation. Disruptive innovation in education are the novel practices, procedures and methods that replaces the existing ones due to cost effectiveness, easy access of usage, availability and sustainability. Any novel practice that failed to meet the listed elements cannot be referred to as disruptive innovation. In the field of education, stakeholders' embrace the use of online teaching, e-management, e-communication, gamification, e- documentation to face out most of the paper work. The invention and usage of this process requires less stress, space, ease access and cost effective.

The indices of disruptive innovation include disruptive innovation acceptability, disruptive innovation accessibility and disruptive innovation sustainability. Disruptive acceptability refers to the perception or feeling in which workers (including teachers and school administrators) have toward new model or intervention designed for carrying out their tasks in an organisation. It can also be viewed as the acceptance of emergency of practice that replaces the existing practices due to cost effectiveness and sustainability. On the other hand, disruptive accessibility is the availability of invented gadgets or

devices, strategies and methods that can be used to reduce wastage of resources in good goal attainment. The installation of relevant applications available on devices enhances ease access to information needed and procedures to improve teaching and learning for goal accomplishment.

Sustainable innovation are those innovations that are acceptable and satisfied by consumers or human resource who are to use the innovations. It involves the use of appropriate approaches among a variety of dimensions to benefit society and the environment, as well as delivering positive economic consequences (Boons, Montalvo, Quist, & Wagner, 2013). It also deals with how the challenges confronting an institution can be solved. Hoang, Hoang, Vu, and Le (2021) argued that sustainability of innovation require a well-defined strategies and policies to be used along with the innovation to make it more friendly to end users. Sustainable disruptive innovation should be the type that will make a bridge between institution performance and economic expansion in such a way that society will enjoy ample benefit (Hoang, Hoang, Vu, & Le, 2021). Sustainability of an innovation is achieved when the processes and strategies adopted while using the innovation or technology is efficient and is able facilitate operation without having much negative impact (Hoang, Hoang, & Kane, 2020). Similarly, Sagar (2023) asserted that sustainability is achieved when the innovation brings about a positive change in social, economic, and environmental aspect of an institution or organisation.

Disruptive innovation has the tendency to enhance effectiveness of public secondary schools. For instance, Oladele and Omotayo (2014) in their study found that implementation of technology in human resources management enhances organisational performance and also helps in saving human and other resources. Also, Nguyen (2015) affirmed that disruptive technology has made teaching and learning process more effective and interesting, and such learning involves the use of SMART classroom and online classroom. Disruptive accessibility may have effect on students' engagement. In line with this statement, Purinton and Burke (2020) in their studies reported that access to a technology-enabled brand management class activity requiring students to promote brand growth by creating and sharing a video online increased students' engagement. Likewise, Essuman, Boso, and Annan (2022) reported that disruption absorption and recoverability have positive effects on operational efficiency.

Sagar (2023) argued that through innovations, organisations management can make informed decisions that align with sustainability goals while leveraging technology for competitive advantage. This may be why secondary school stakeholders embrace implementation of new, innovative ideas, products and services that disrupt traditional teaching and learning methods. These include online and blended learning platforms, virtual argumentation, gamification and personalise learning which seems to have reduced resource consumption and help teachers' mastery of subject contents. However, institutional effectiveness depends on the quality of teaching and learning processes in schools as well as the adoption of appropriate innovation tools for teaching and school management. This implies that indices of disruptive innovation have the tendency to enhance institutional effectiveness. It is against this background that this paper investigated disruptive innovation indices and institutional effectiveness in public secondary schools in Lagos State.

Statement of the Problem

In spite of the continuous monitoring and evaluation of secondary schools activities to ensure standards for improvement by officers from the Lagos State Office of Education Quality Assurance (OEQA), interventions that promote long life learning, alleviate poverty, economic development and foundation required for manpower seems not to be embraced by school leaders. Also, the adoption of technological advancement such as the use of gamification, electronic schedule, e - reporting interactive board, online learning platforms and innovative practices that could reduce the cost of education and school administration received little attention by the stakeholders. Equally, the provision of personnel resources to teach and facilitate accomplishment of skills to create jobs, enhance critical

thinking and disruptive innovation practices are not adequately deployed by the government and this appeared to have increased the level of academic performance disparities leading to average performance in West Africa Examination Council (WAEC) repeatedly in the last four years in Lagos State as reported by National Bureau of Statistics (2022).

The perceived institutional effectiveness deviation in the Lagos State public secondary schools could be due to lack of relationship between disruptive innovation indices which include disruptive innovation acceptability, accessibility and sustainability and institutional effectiveness. Despite the significance of disruptive innovation indices in enhancing institutional effectiveness in public secondary schools, it is noted that few empirical studies exist on disruptive innovation in relation to institutional effectiveness in public secondary schools in Lagos State, Nigeria. This knowledge gap limits policymakers' and education stakeholders' ability to understand how disruptive innovation indices impact on school effectiveness. Therefore, it becomes necessary for this paper to fill this gap. Hence, this paper assessed the relationship between disruptive innovation indices and institutional effectiveness in Lagos State public secondary schools.

Purpose of the Study

The purpose of this paper was to investigate disruptive innovation indices and institutional effectiveness in public secondary schools in Lagos State. The specific objectives of this paper are to:

i. examine the relationship between disruptive innovation acceptability and institutional effectiveness in Lagos State public secondary schools;

ii. establish the relationship between disruptive innovation accessibility and institutional effectiveness in Lagos State public secondary schools; and

iii. ascertain the relationship between disruptive innovation sustainability and institutional effectiveness in Lagos State public secondary schools.

Research Hypotheses

The following null hypotheses were tested in this study:

Ho_1: There is no significant relationship between disruptive innovation acceptability and institutional effectiveness in Lagos State public secondary schools.

Ho_2: There is no significant relationship between disruptive innovation accessibility and institutional effectiveness in Lagos State public secondary schools

Ho_3: There is no significant relationship between disruptive innovation sustainability and institutional effectiveness in Lagos State public secondary schools.

Methods

This study was carried out in Lagos State. The study employed correlational survey research design. The population of this study comprised 672 secondary schools with a principal in every school and 17,954 teachers as shown on the 2022 Annual School Census Report released by the Lagos State Ministry of Education, Alausa Ikeja. The study used Slovin's formula to determine the minimum sample size. The researcher adopted 95% confidence level and 5% margin error because of the large population of the schools. Also, 251 school were selected as sample size according to the mathematical sample size calculator. Numbers with approximation were rounded off as stated by the law of Slovin's formula of 1960. This is relevant to the study because only minimum sample size is to be determined and human being cannot be fractionalised. A multi-stage sampling procedure was employed to select the samples for the study due to the large number of the population under study. Also, division of Education Districts into clusters in Lagos State informed the selection of the approach. Sampling unit were determined from higher to lower cluster at each stage. Proportionate stratified sampling was adopted for even representation of Teachers. Fifteen percent of the total teachers' population (2693) was used as sample size for the teachers. In addition, all the 251 principals of the selected schools were

purposively involved in the study as respondents. The selected respondents formed proportionately even representation for this study. Consequently, the sample size for this paper was 2,944.

The instrument used for this study was two questionnaires titled "Disruptive Innovation Indices and Institutional Effectiveness Questionnaire for Teachers (DIIIEQ-T)" and Disruptive Innovation Indices and Institutional Effectiveness Questionnaire for Principals (DIIIEQ-P). The DIIIEQ-T consisted of 15 items that measured disruptive innovation indices such as disruptive innovation acceptability, accessibility and sustainability with a four - point likert type scale; strongly Agree(4), Agree (3), Disagree (2) and strongly Disagree (1). The DIIIEDQ-P consisted of 10 items on institutional effectiveness with a four - point likert type scales of Highly Effective(4), Effective(3), ineffective(2), and Very Ineffective(1).

The reliability of the instruments were determined using Cronbach's Alpha reliability method and coefficient values of 0.78 and 0.80 were obtained for DIIIEDQ-T and DIIIEDQ-P respectively. The researcher and six trained assistants administered the copies of the questionnaire to the respondents and collected the copies filled from each of the respondents. The data collected were analysed using mean, standard deviation, and Pearson Product Moment Correlation Coefficient at 0.05 level of significance.

Results

Ho_1: There is no significant relationship between disruptive innovation acceptability and institutional effectiveness in Lagos State public secondary schools.

Table 1

Disruptive innovation acceptability and institutional effectiveness in Lagos State public secondary schools

Variable	Mean	SD	N	df	r-cal	p-value	Decision	Remarks
Disruptive Innovation Acceptability	3.33	1.10						
			2944	2942	0.287	0.001	H_0: Rejected	Significant
Institutional Effectiveness	3.40	0..67						

*Correlation is significant at 0.05 level (2 tailed)

Table 1 shows the results of Pearson Product Moment Correlation used to determine the relationship between disruptive innovation acceptability and institutional effectiveness in public secondary schools in Lagos State. The findings showed that there is positive correlation between disruptive innovation acceptability and institutional effectiveness ($r = 0.287$; $df = 2942$; $p = 0.001 < 0.05$). Thus, the null hypothesis which states that "There is no significant relationship between disruptive innovation acceptability and institutional effectiveness in Lagos State public secondary schools" was rejected. This implies that there is significant relationship between disruptive innovation acceptability and institutional effectiveness in public secondary schools in Lagos State.

Ho_2: There is no significant relationship between disruptive innovation accessibility and institutional effectiveness in Lagos State public secondary schools.

Table 2

Disruptive innovation accessibility and institutional effectiveness in Lagos State public secondary schools

Variable	Mean	S.D	N	df	r-cal	p-value	Decision	Remarks
Disruptive Innovation Accessibility	3.34	1.77						
			2944	2942	0.069	0.119	H_0: Accepted	Not Significant
Institutional Effectiveness	3.40	0.67						

*Correlation is not significant at 0.05 level (2 tailed)

Table 2 shows the results of Pearson Product Moment Correlation used to determine the relationship between disruptive innovation accessibility and institutional effectiveness in public secondary schools in Lagos State. The findings showed that there is positive, but low correlation between disruptive innovation accessibility and institutional effectiveness ($r = 0.069$; $df = 2942$; $p = 0.119 > 0.05$). Thus, the null hypothesis which states that "There is no significant relationship between disruptive innovation accessibility and institutional effectiveness in Lagos State public secondary schools" was accepted. This implies that there is no significant relationship between disruptive innovation accessibility and institutional effectiveness in public secondary schools in Lagos State.

Ho_3: There is no significant relationship between disruptive innovation sustainability and institutional effectiveness in Lagos State Public Secondary Schools.

Table 3

Disruptive innovation sustainability and institutional effectiveness in Lagos State public secondary schools

Variable	Mean	SD	N	df	r-cal	p-value	Decision	Remarks
Disruptive Innovation Sustainability	3.38	1.61						
			2944	2942	0.838	0.000	H_0: Rejected	Significant
Institutional Effectiveness	3.40	0.67						

*Correlation is significant at 0.05 level (2 tailed)

Table 3 shows the results of Pearson Product Moment Correlation used to determine the relationship between disruptive innovation sustainability and institutional effectiveness in public secondary schools in Lagos State. The findings showed that there is positive correlation between disruptive innovation sustainability and institutional effectiveness ($r = 0.838$; $df = 2942$; $p = 0.000 < 0.05$). Thus, the null hypothesis which states that "There is no significant relationship between disruptive innovation sustainability and institutional effectiveness in Lagos State Public Secondary Schools" was rejected. This implies that there exists significant relationship between disruptive innovation sustainability and institutional effectiveness in public secondary schools in Lagos State.

Discussion of Findings

This paper revealed that significant relationship existed between disruptive innovation acceptability and institutional effectiveness in public secondary schools in Lagos State. This means that disruptive innovation acceptability and institutional effectiveness are significantly related in public secondary

schools in Lagos State. Corroborating this finding, Kelly, Jo, Eweje, and Scott (2017) found that disruptive acceptability can help to bring improvement in the efficiency and effectiveness of an institution. Also, Oladele and Omotayo (2014) reported that implementation of technology in human resources management enhances organisational performance and also helps in saving human and other resources. Similarly, Stanley and Aggarwal (2019) reported that acceptance of technology enhanced the efficiency of human resources management activities and practices. This implies that disruptive innovation is positively correlated with institutional effectiveness.

This study established that there was no significant positive relationship between disruptive innovation accessibility and institutional effectiveness in public secondary schools in Lagos State. This implies that disruptive innovation accessibility and institutional effectiveness are not significantly related in public secondary schools in Lagos State. This may be due to differences in the level of disruptive innovation accessibility and institutional effectiveness in most of the government-owned secondary schools in Lagos State. This may also be due to low availability of invented gadgets produced to improve performance of users and reduce resources wastage in goal attainment in most of the public secondary schools. In schools where disruptive innovation is accessible and utilised, it tends to bring about improvement in school effectiveness. In line with this view, Nguyen (2015) reported that disruptive technology has made teaching and learning process more effective and interesting, and such learning involves the use of SMART classroom and online classroom. Similarly, Boozer and Simon (2020) found that digital platforms were effective with students' homework and in problem-solving, potentially increasing students' engagement.

This paper found that significant relationship existed between disruptive innovation sustainability and institutional effectiveness in public secondary schools in Lagos State. This means that disruptive innovation sustainability and institutional effectiveness are significantly related in public secondary schools in Lagos State. Supporting this finding, Eiraldi et al. (2019) reported that a number of comprehensive school-wide prevention approaches have been found to have a positive effect on an array of individual student's behavioural, emotional and academic outcomes as well as on school climate. Also, Sagar (2023) reported that through innovations, orgnaisations management can make informed decisions that align with sustainability goals while leveraging technology for competitive advantage.

Conclusion

Institutional effectiveness is crucial for the attainment of educational objectives. Thus, the realization of secondary education objectives depends among others on the acceptability, accessibility and sustainability of disruptive innovation by secondary school teachers and administrators for carrying out their duties. Hence, it can be concluded based on the findings of this study that disruptive innovation indices and institutional effectiveness were significantly related in public secondary schools in Lagos State, Nigeria.

Recommendations

Based on the findings of this study, the following recommendations were made:

1. Secondary schools' teachers and principals should accept various innovative practices which can enhance their institutional effectiveness. This should include regular use of innovative technology for teaching, learning and school management.
2. Government should provide regular training for teachers and principals on the adoption of innovative practices for the enhancement of their schools' effectiveness.
3. Secondary schools' teachers and principals should always adopt innovative practices in the course of carrying out their duties. This will enhance institutional effectiveness among public secondary schools.

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PARENTAL ENGAGEMENT AS A CORRELATE OF IN-SCHOOL ADOLESCENTS' INTEREST IN STEM FIELDS IN KWARA STATE

BY

UYANNE, Elizabeth Obiageli, Ph.D.: Department of Social Sciences Education, Faculty of Education, University of Ilorin, Ilorin, Nigeria
BADAMAS, Omoshalewa Lasbat, Ph.D.: Department of Social Sciences Education Faculty of Education, University of Ilorin, Ilorin, Nigeria

Abstract
This study investigated parental engagement as correlate of in-school adolescents' interest in STEM fields in Kwara State. This study employed a descriptive research design of a correlational type. The population for this study comprised all junior secondary school students in Kwara State. The target population comprised all junior secondary school in Ilorin. There were 79 public secondary schools in Ilorin. Simple random sampling technique was used to select 10 students in 25 schools bringing the total number of respondents to 250. An adapted questionnaire titled "Questionnaire on Parents Engagement and Adolescent Interest in STEM" (QPEAI_STEM) was used to collect the data. The findings showed that the level of parental engagement among In-school Adolescents in Kwara State was relatively low. There was significant high positive relationship between Parental Engagement and Adolescents' Interest in STEM fields in Kwara State. The study recommended that educational psychologist and teachers should raise awareness about the significance of parental involvement in STEM education and address any existing barriers to foster a supportive environment for adolescent learners in the region. The state government should develop comprehensive strategies aimed at enhancing STEM engagement, providing hands-on experiences, and showcasing the relevance and real-world applications of STEM disciplines to inspire and cultivate interest among in-school adolescents in Kwara State.

Keyword*: Parental Engagement, STEM, Adolescents' Interest*

Introduction

The exploration of parental engagement role in shaping adolescents' interest in Science, Technology, Engineering, and Mathematics (STEM) fields stands as a crucial area for study in the context of Kwara State, Nigeria. This correlation takes on a unique and complex dimension, illustrating the intricate connection between parental psychology and its impact on adolescents' academic pursuits. Unraveling the influence of parental engagement on in-school adolescents' interest in STEM fields holds the potential not only to illuminate teachers and educational psychologist but also to profoundly influence individual achievements of adolescents and societal advancement. This research tries to understand how parental engagement influences the interest of adolescents pursuing STEM disciplines within Kwara State's educational landscape.

Parental engagement refers to the active and positive involvement of parents or caregivers in a child's education, development, and well-being (Goodall & Montgomery, 2014). It encompasses a wide range of actions, behaviors, and interactions that parents undertake to support their child's learning and growth. This involvement can take various forms, including but not limited to, assisting with homework, attending school events, communicating with teachers, participating in school activities, providing emotional support, fostering a conducive home environment for learning, advocating for their child's needs within the educational system, and instilling values that promote education and curiosity (Novianti & Garzia, 2020). Jeynes (2018) stated that parental engagement is considered a crucial factor in a child's academic success, social development, and overall well-rounded growth.

It is an established fact that parental engagement plays a pivotal role in shaping a child's academic success and overall development (Wilder, 2014; ; Novianti & Garzia, 2020). This involvement encompasses a spectrum of activities, from basic interactions at home to active engagement in school-related matters. At its core, Fajoju et al. (2016) highlighted that parental involvement serves as a catalyst for a child's academic motivation and achievement. Studies consistently demonstrate that when parents actively participate in their child's education by

providing a supportive home environment, monitoring homework, and engaging in conversations about school, children tend to exhibit higher levels of motivation, improved behavior, and enhanced academic performance (Kimathi, 2014; Shah et al., 2016; Liu et al., 2020) . This involvement fosters a sense of accountability and instills the value of education from an early age.

In addition, Olaosebikan and Olusakin (2014) emphasized that parental involvement goes beyond academic support; it significantly influences a child's socioemotional development. When parents engage with educators and participate in school activities, it reinforces a collaborative partnership between home and school, creating a conducive environment for a child's holistic growth (Ugwuanyi et al., 2020). This collaborative approach not only positively impacts a child's social skills and emotional well-being but also contributes to a more comprehensive and enriched learning experience (Rentzou & Ekine, 2017). However, the impact of parental involvement is not uniform and can be influenced by various factors. Socioeconomic status, cultural norms, and parental education levels have been shone to significantly shape the extent and nature of involvement (Povey et al., 2016). In some cases, barriers such as time constraints, language barriers, or lack of resources can impede parents' ability to actively engage in their child's education, leading to disparities in educational outcomes (Robinson & Harris, 2014).

Furthermore, the quality of parental involvement matters as much as the quantity. Merely being physically present or overseeing academic tasks without emotional support or understanding a child's individual needs might not yield the desired outcomes. Park and Holloway (2013) submitted that authentic engagement, where parents actively communicate, show genuine interest, and provide guidance tailored to their child's unique strengths and weaknesses, holds greater significance. As a result, the study of Barger et al. (2019) suggested that parent involvement is critical in stimulating adolescents' interest into STEM-related field.

The terms in-school adolescents' interest in STEM connote young adolescent curiosity, enthusiasm, and motivation towards engaging with and pursuing studies or activities related to these fields within an educational setting (Taskinen et al., 2013). It encompasses a positive inclination, eagerness to learn, and a genuine passion for exploring various aspects of science, technology, engineering, or mathematics subjects offered within their secondary school curriculum (Mohr-Schroeder et al., 2014). This interest may manifest through active participation in STEM-related classes, clubs, projects, competitions, or extracurricular activities, as well as a desire to pursue further education or careers in STEM disciplines. In-school adolescents' interest involves exploring various factors influencing their engagement and motivation in STEM. Psychological theories, such as Self-Determination Theory (SDT) and Social Cognitive Theory (SCT), offer insights into understanding these interests.

Self-Determination Theory posits that individuals are motivated by three innate psychological needs: autonomy, competence, and relatedness (Ryan & Deci, 2017). In the context of STEM, fostering a sense of autonomy by allowing students to explore, experiment, and discover within these subjects has been shown to enhance their interest (León et al., 2015). Sergis et al. (2018) stated that providing choices and control over learning materials or projects can increase intrinsic motivation as well as ensuring a sense of competence through achievable challenges and acknowledging their progress in STEM fields is crucial. The study of Rosenzweig and Wigfield, (2016) indicated that adolescents are more likely to be interested in STEM if they feel capable and competent in these areas. Lastly, relatedness, feeling connected to others especially parents with similar interests, can significantly impact their engagement (Estell & Perdue, 2013). Thus, Howard et al. (2016) stated that building a supportive STEM community within schools can boost interest by fostering a sense of belonging and collaboration according to the Self-Determination Theorist.

Furthermore, another theory that could be used to explain adolescent interest in STEM contexts Social Cognitive Theory. Social Cognitive Theory emphasizes the role of observational learning, self-efficacy, and outcome expectations in shaping interests and behaviour (Schunk & DiBenedetto, 2020). Adolescents' exposure to relatable role models, such as successful scientists or engineers, can positively influence their interest in STEM (Aish et al., 2018). Additionally, developing self-efficacy, belief in one's capability to succeed, in STEM subjects is vital. Lent et al., (2018) noted that encouraging small successes, providing constructive feedback, and offering opportunities for skill development can boost students' confidence in their STEM abilities. Furthermore,

positive outcome expectation believing that engaging in STEM will lead to desirable outcomes like future career success or societal contribution, can fuel interest and commitment (Bradford et al., 2015).

However, Rosenzweig and Wigfield (2016) summited that challenges persist in cultivating sustained interest in STEM fields among adolescents. The complexity of STEM subjects and the perception of these disciplines as difficult or inaccessible can be daunting, leading some students to lose interest or confidence in pursuing them. Also, parental perceptions and stereotypes surrounding STEM disciplines often shape adolescents' interest in these fields (Šimunović & Babarović, 2020). Prevailing gender stereotypes, for instance, might deter girls from pursuing STEM due to the misconception that these fields are primarily male-dominated (Wang & Degol, 2013).

Parental involvement seems to play a significant role in shaping adolescents' interest in STEM. Numerous studies suggest that parental engagement, encouragement, and attitudes towards STEM subjects significantly influence adolescents' perceptions and eventual choices regarding these disciplines (Lloyd et al. 2018; Wang & Sheikh-Khalil 2014; Regan & DeWitt, 2014). However, the impact of parental involvement on adolescents' STEM interest is complex and multifaceted, encompassing both positive and negative aspects.

On the positive side, studies have suggested that supportive parental engagement in STEM can serve as a catalyst for adolescents' interest and success in these fields (Simpkins et al., 2015; Dou et al., 2019). Parents who demonstrate enthusiasm for STEM subjects, offer resources, and engage in discussions or activities related to science and technology create an environment that fosters curiosity and exploration (Young et al., 2017). Additionally, parental encouragement and support in the form of providing educational materials, arranging visits to science museums, or enrolling adolescents in STEM-related programs can significantly influence their attitudes and engagement with these subjects (Xie et al., 2015). Moreover, parental involvement can help shape positive beliefs and attitudes towards STEM careers, reinforcing the value and relevance of these fields in the future (Banerjee, 2016).

However, the impact of parental involvement in STEM on adolescents can also have limitations and challenges. Some studies suggest that parental influence, if overly directive or pressurizing, might lead to counterproductive outcomes (Mohr-Schroeder et al., 2014). High levels of parental pressure or expectations in STEM can create stress and anxiety in adolescents, potentially diminishing their interest in these subjects (Chachashvili-Bolotin et al., 2016). Furthermore, the lack of parental knowledge or confidence in STEM topics might inadvertently transmit negative attitudes or beliefs about these fields to adolescents, hindering their interest and confidence (Mau & Li, 2018).

Dotterer (2022) investigated parent involvement, expectancy values, and STEM outcomes among underrepresented adolescents. This research used data from the High School Longitudinal Study: 2009 (HLS: 2009) to explore connections between parental engagement and underrepresented students' confidence, perceived value, interest, and performance in STEM fields. Using MPlus, both immediate and long-term models were employed to investigate if parental involvement in 9th grade could predict interest and performance in STEM directly and indirectly through self-confidence and perceived value. The immediate models indicated a significant correlation between parental engagement in STEM and young individuals' belief in their STEM capabilities, which subsequently related to their interest and performance in STEM. Long-term models demonstrated that parents' involvement in STEM during 9th grade predicted the belief in adolescents' STEM capabilities in 11th grade, subsequently impacting their overall performance in STEM courses. Parental involvement in STEM was consistently more strongly associated with self-confidence than perceived value. These findings imply that parental engagement in STEM contributes to adolescents' confidence in their STEM skills, but might not necessarily influence their perceived value of STEM subjects.

In addition, the study of Šimunović and Babarović (2020) investigated the structure of middle school students' interest in STEM careers and how parental engagement in STEM-related behaviors influenced this interest. The research involved 488 students reporting their eighth-grade interest (average age: 14.48 years), with parental data collected approximately 15 months earlier. Parents (also 488 in number) reported on their encouragement of their child's STEM pursuits, provision of STEM resources, and their own involvement in STEM activities. Additionally, students' grades in STEM subjects were gathered at the end of seventh grade. The findings

indicated that, at this age, students distinguished between their interest in science and engineering-technology career paths. Boys exhibited higher interest in STEM than girls, specifically in the engineering-technology domain. Previous achievement in STEM subjects predicted interest in science but not in engineering-technology. Once accounting for gender and STEM performance, parental support equally predicted both types of STEM interest for both genders. However, parents tended to report more involvement in STEM practices concerning their sons compared to their daughters. The results were discussed within the context of children's development of STEM career interest and existing gender-based patterns in familial STEM socialization. The study also deliberated on implications for interventions and curricula in the STEM field.

Also, Ochoa (2021) explored the potential link between increased levels of parental involvement and heightened student STEM efficacy. It closely followed the Hoover-Dempsey Model of Parental Involvement Processes, indicating that methods of parental involvement act as pathways through which parental factors, such as self-efficacy, influence academic outcomes like student self-efficacy. The research also investigated parental efficacy and the impact of immersion classes on parental involvement. By adjusting the data for non-normally distributed parental involvement measures, the analysis revealed significant correlations between four parental involvement variables and three student efficacy variables when considered as sets. The Hayes Process Macro for SPSS identified direct effects of parent efficacy on student efficacy in mathematics but not in science or technology/engineering. while no significant mediation relationships were found between the variables, parental efficacy significantly correlated with three parental involvement mediators, encouragement, instruction, and modeling, while reinforcement was notably linked to student efficacy in math.

Statement of the Problem

In Kwara State, there seems to exist a significant gap in fostering adolescent interest in STEM, which may be primarily due to insufficient parental involvement. Regardless of the importance of STEM education for future employability and innovation, many in-school adolescence lack adequate exposure and encouragement at home, leading to disinterest in these fields. Parents often prioritize traditional career paths or are unaware of the opportunities STEM fields offer, resulting in minimal support or encouragement for their children to pursue these subjects. This seemingly lack of parental engagement in nurturing STEM interest perpetuates a cycle where students remain unaware or unenthusiastic about STEM disciplines, hindering their potential and the region's capacity for technological advancement and competitiveness on a global scale.

Despite the acknowledged significance of parental influence on adolescents' academic interests (Dotterer 2022**;** Šimunović & Babarović 2020; Ochoa 2021). There remains a gap in literature to understand, the specific correlations between parental involvement and the cultivation of interest in STEM among adolescents within the context of Kwara State. This study centers on delineating the extent and nature of parental involvement and its direct impact on adolescents' inclination and enthusiasm towards STEM subjects in this particular region. Therefore, this study investigated parental involvement as correlate of in-school adolescents' interest in STEM fields in Kwara State.

Purpose of the Study

The main purpose of this study is to examine parental involvement as correlate of in-school adolescents' interest in STEM fields in Kwara State. Specifically, the study investigated:

1. the level of parental engagement among in-school adolescents' in Kwara State
2. the level of In-school Adolescents' Interest in STEM Fields in Kwara State.
3. relationship between parental involvement and in-school adolescents' interest in STEM fields in Kwara State.

Research Questions

1. What is the level of parental engagement among in-school adolescents in Kwara State?
2. What is the level of In-school adolescents' interest in STEM fields in Kwara State?
3. Is there significant relationship between parental involvement and in-school adolescents' interest in STEM fields in Kwara State?

Research Hypothesis

Ho_1: There is no significant relationship between parental engagement and in-school adolescents' interest in STEM fields in Kwara State.

Methodology

This study adopted a descriptive research design of a correlational type. The population for this study comprised all junior secondary school students in Kwara State. There were 535 secondary schools and 29,677 students in Kwara State (National Bureau of Statistics, 2023). The target population comprised all junior secondary school in Ilorin. There were 79 Public secondary schools in Ilorin (Kwara State Ministry of Education, 2021). Simple random sampling technique was used to select 10 students in 25 schools bringing the total number of respondents to 250.

An adapted questionnaire titled "Questionnaire on Parents Engagement and Adolescent Interest in STEM (QPEAI_STEM)" was used to collect data. The questionnaire was divided into three sections – A, B and C. Section "A" was used to elicit the demographic features of the respondents. This included gender. Section "B"; was used to elicit response on students' parental engagement. Parental Engagement Inventory, developed by Dotterer 2022 was adapted using 4-point Likert scale and coded as; Strongly Disagree (1), Disagree (2) Agree (3) and Strongly Agree (4) were used as the scale of measurement. Section C was used to elicit information on adolescent interest in STEM field. Adolescent interest inventory, developed Olaosebikan and Olusakin (2014) was adapted for the study. 4-point Likert scale method of 4=Very True of Me, 3= True of Me, 2= Rarely True of Me, 1= Not True of Me suggested by the developers as the scale of measurement.

Face and content validity was conducted under the supervision of two educational psychologists and two research measurement experts in the Department of Social Sciences of Education, Faculty of Education, University of Ilorin. After which the instrument was administered on a set of 50 students, who were not part of the targeted population of the study but with similar characteristics, to test for reliability. After the instrument was received, Cronbach Alpha was used to check the reliability coefficient to determine if the instrument was reliable or not using split-half reliability method. Parental Engagement had a reliability coefficient of 0.69, Vocational aspiration inventory had a reliability coefficient of 0.73 and Adolescent interest in STEM field inventory had a reliability coefficient of 0.71, which made the instrument reliable for use.

The researcher administered the questionnaire on the students following all research ethics procedures. The researcher sought the permission of the school management before administering the questionnaire assuring them of confidentiality and animosity. Furthermore, no respondent was compelled to give response to the instrument; the distribution of the instrument was determined by the willingness of the respondents. Also, in the administration of the questionnaire as regard to this study, the right of the respondents was put into utmost consideration and was not be infringed upon. The respondents were asked to make a tick (√) where necessary. Copies of the questionnaires were filled and collected immediately to forestall any attrition.

Percentage and frequency count were used to answer research questions 1 and 2. Research question 3 was converted into hypothesis and the hypothesis was tested using Pearson Product Moment Correlation (PPMC) statistic at 0.05 level of significance.

Result

Answering the Research Questions

Research Questions 1: *What is the level of parental engagement among in-school adolescents' in Kwara State?*

To answer the research question, the items on parental engagement were summed and subjected to percentage analysis. The minimum, maximum and range score obtainable from the respondents were 33, 62 and 29 respectively. The range was divided by the three levels (high, average and low) and the cut off range scores were 33-43, 44-52 and 52-62 categorized as low, average and high level of parental engagement respectively. The result is presented in Table 1.

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Table 1
level of parental engagement among In-school Adolescents' in Kwara State

Levels	Cutoff Range	Frequency	Percentage (%)
Low	33-43	105	42
Average	44-52	80	32
High	47-62	65	26
Total		**250**	**100.0**

Result in Table 1 reveals the level of parental engagement among In-school Adolescents' in Kwara State. As shown in the table, 105(42%) of the respondents got low score, 80(32%) of the sampled respondents got average score and 65(26%) of the respondents got high score. This means that the level of parental engagement among In-school Adolescents' in Kwara State was relatively low.

Research Questions 2: *What is the level of in-school adolescents' interest in STEM Fields in Kwara State?*
To answer the research question, the items on In-school Adolescents' Interest in STEM Fields were summed and subjected to percentage analysis. The minimum, maximum and range score obtainable from the respondents were 26, 69 and 43 respectively. The range was divided by the three levels (high, average and low) and the cut off range scores were 33-43, 44-52 and 52-62 categorized as low, average and high level of parental engagement respectively. The result is presented in Table 2.

Table 2
Level of In-school Adolescents' Interest in STEM Fields in Kwara State

Levels	Cutoff Range	Frequency	Percentage (%)
Low	26-40	123	49.2
Average	41-55	76	30.4
High	56-69	51	20.4
Total		**250**	**100.0**

Result in Table 2 reveals level of in-school adolescents' interest in STEM Fields in Kwara State. As shown in the table, 123(49.2%) of the respondents got low score, 76(30.4%) of the sampled respondents got average score and 51(20.4%) of the respondents got high score. This means that level of In-school Adolescents' Interest in STEM Fields in Kwara State was relatively low.

Hypothesis Testing
Ho_1: There is no significant relationship between Parental engagement and In-school Adolescents' Interest in STEM Fields in Kwara State.

In order to test the hypothesis, responses of students that addressed parental engagement and In-school Adolescents' Interest in STEM Fields were collated on a statistical coding sheet. The set of data was subjected to Pearson Product Moment Correlation (PPMC) statistic to determine the degree of association. The result was depicted in Table 3.

Table 3
Parental engagement and in-school adolescents' interest in STEM Fields in Kwara State

Variables	r - cal.	p-value	Remark
Parental Engagement			
	0 .781	0.000	Significant
Adolescents' Interest in STEM			

Table 3 reveals the r-calculated value (0.371) and the p-value (0.000) of Adolescents in Kwara State. Since the calculated p-value (0.000) was less than 0.05 level of significance value (0.00<0.05). This means that the null hypothesis was rejected, meanwhile the r-calculated value of 0.371 was moderately positive; hence, there was significant highly positive relationship between Parental Engagement and Adolescents' Interest in STEM field in

Kwara State.

Discussions of Findings

The finding of the study demonstrated that the level of parental engagement among In-school Adolescents' in Kwara State was relatively low. This finding raises concerns about the potential impact on students' academic and career trajectories, particularly in STEM fields. Limited parental involvement in fostering interest and support for STEM education might hinder students' motivation and access to resources critical for success in these domains. This finding aligns with a study by Thomas et al. (2020) that highlighted the correlation between low parental engagement and reduced academic outcomes, particularly in STEM subjects. The scarcity of parental involvement in Kwara State might signify a lack of awareness about the importance of STEM education or barriers preventing parents from actively engaging in their children's learning experiences, potentially hindering students' pursuit of STEM-related opportunities and career pathways.

Furthermore, the study shows that the level of In-school Adolescents' Interest in STEM Fields in Kwara State was relatively low. The discovery raises concerns about the region's potential to cultivate future professionals in science, technology, engineering, and mathematics. This finding suggests a lack of enthusiasm or motivation among students in these critical domains, potentially indicating a gap in exposure, resources, or engagement with STEM-related subjects. The study's alignment with research by Staus et al. (2020) underscored the significance of low interest in STEM fields among adolescents and its repercussions on future career choices and educational pursuits. In Kwara State, this low interest might signify a lack of awareness or inadequate exposure to the diverse and rewarding aspects of STEM careers, possibly limiting students' future academic and professional opportunities in these fields.

Finally, the study revealed that there was highly significant positive relationship between Parental Engagement and Adolescents' Interest in STEM field in Kwara State. This finding underscores the pivotal role of parental involvement in fostering enthusiasm and motivation among students for STEM disciplines. This finding suggests that when parents actively engage and support their children in STEM-related activities and discussions, it positively influences adolescents' interest in these fields and vice versa. This aligns with a study by Šimunović and Babarović (2020) that emphasised the influential role of parental encouragement and involvement in shaping adolescents' attitudes and aspirations toward STEM careers. In Kwara State, this robust connection emphasizes the potential for parental engagement to serve as a catalyst in nurturing a culture of STEM interest among adolescents, thereby highlighting the importance of involving parents as key influencers in promoting STEM education and career pathways for their children.

Conclusion

The correlation between parental engagement and in-school adolescents' interest in STEM fields in Kwara State highlights a crucial relationship crucial for fostering enthusiasm and motivation among students in these critical domains. This connection underscores the pivotal role parents play in shaping and influencing adolescents' attitudes, motivations, and aspirations toward STEM disciplines. The findings suggest that there is a significant positive relationship between parental involvement and adolescents' interest in STEM fields. This underscores the importance of promoting and encouraging parental engagement as a means to inspire and cultivate interest among adolescents in Kwara State towards pursuing STEM education and future career paths in these fields.

Recommendations

The following recommendation was put forward based on the findings;

1. Educational psychologist and teachers should raise awareness about the significance of parental involvement in STEM education and addressing any existing barriers to foster a supportive environment for adolescent learners in the region.
2. The state government should develop comprehensive strategies aimed at enhancing STEM engagement, providing hands-on experiences, and showcasing the relevance and real-world applications of STEM disciplines to inspire and cultivate interest among in-school adolescents in Kwara State.
3. School management and authorities should further strengthen and encourage parents to be involve in their children schooling to enhance adolescents' interest and engagement in STEM fields.

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