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HARNESSING PHYSICS FOR ENTREPRENEURSHIP EDUCATION IN AN ERA OF UNCERTAINTIES IN NIGERIA

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Abstract

In Nigeria, amidst a backdrop of uncertainties, the integration of physics into entrepreneurship education presents a promising avenue for fostering innovation and resilience among aspiring entrepreneurs. This study explores the significance of harnessing physics in entrepreneurship education to navigate the challenges posed by uncertainties in Nigeria. The study therefore employed a descriptive survey design to investigate secondary school teachers' perceptions on physics entrepreneurship content. A total number of 40 physics teachers from Irepodun Local Government Area, Kwara State were used for the study using proportionate sampling method. One research question was raised in order to guide the study, while a corresponding hypothesis was tested at 0.05 level of significance. A researcher-designed questionnaire was used for data collection. This study concluded that resources available in private schools could foster more positive perceptions of entrepreneurial skills in physics. It is recommended that there should be strong synergy between teachers in public and private schools in order to facilitate knowledge sharing regarding entrepreneurial skill development. By leveraging physics to teach critical thinking, problem-solving, and technological applications, the aspiring entrepreneurs can develop strong skills for dynamic market conditions and sustainable growth.

Keywords: Entrepreneurship Education, Physics Education, Physics, Uncertainties

Introduction

Nigeria is currently navigating an era of significant uncertainties, characterized by political challenges, economic instability, and social unrest. The convergence of these factors has created a precarious environment for both citizens and businesses, exacerbating vulnerability and complicating recovery efforts following the COVID-19 pandemic. According to *Financial Nigeria* (2024), the political challenges posed to the citizens have caused Nigerians to experience significant turmoil, particularly during the transition of power following the 2023 elections. The new administration after elections has been marked by both optimism and skepticism. While there are hopes for economic reforms, the political landscape remains tense with challenges, including insecurity and governance issues.

The persistence of violence and terrorism in various regions has undermined public safety and stability, further complicating the government's ability to implement effective policies (Financial Nigeria, 2024). Another factor instigating the era of uncertainties in Nigeria is economic instability. The Nigerian economy has been heavily impacted by global events, particularly the fallout from the Russia-Ukraine war, which has intensified existing economic challenges. The country's dependence on crude oil has made it particularly susceptible to fluctuations in global oil prices, leading to macroeconomic instability marked by high inflation, exchange rate volatility, and fiscal constraints (Nigerian Economic Summit Group [NESG], 2024).

The economic landscape has been further complicated by structural issues, including inadequate infrastructure and limited access to investment capital. These challenges have muffled business growth and daunted foreign investment, leading to a lack of confidence among investors (African Development Bank [AfDB], 2020). The World Bank has projected that Nigeria's economic recovery will be slow, with many households facing increased financial strain due to rising costs of living and declining purchasing power (AfDB, 2020). Social unrest in an era of uncertainties in Nigeria has amplified tensions among various groups within Nigeria. The economic hardships faced by the populace have led to increased dissatisfaction and protests, particularly among youth who are disproportionately affected by unemployment and poverty (NESG, 2024). The combination of economic and political instability has created unstable environment that poses risks to social cohesion and national security. With all these factors fighting the development of economic and citizens, there need every hand to be on deck in mitigating against these factors which physics is not an exception.

Physics is classified as one of the branch of science that studies the properties and interactions of matter and energy. According to Britannica (2024), physics is concerned with understanding the structure of matter and the interactions between the fundamental constituents of the observable universe. This includes the study of forces such as gravity, electromagnetism, and nuclear forces, as well as the laws governing motion and energy transformations. Anon (2022) defined physics as the study of nature as well as the interactions between objects and energy in an environment. One of the importance of physics education is its capacity to develop critical thinking and problem-solving skills among students. Physics encourages learners to analyze complex problems, formulate hypotheses, and conduct experiments to validate their ideas. This process not only enhances their understanding of scientific principles but also equips them with essential skills applicable in other fields, including engineering, medicine, and information technology (Attique-Khan, 2023).

In addition, physics education adopts innovation and creativity. The principles learned in physics are fundamental in developing new technologies and solutions to contemporary issues, such as climate change and energy sustainability. For example, the knowledge of laws of thermodynamics and energy transfer can lead to developments in renewable energy technologies, which are crucial for a sustainable future (Ma, 2020). Amadalo et al (2012) opined that physics plays significant roles in commanding technological advancement, supporting national wealth, health improvement and most especially accelerating industrialization. Utibe and Ugah (2014) also grieved that in spite of all the contributions and importance of physics, countless number of graduates of physics education have not been able to utilize the knowledge acquired from school. Hence, in view of all these importance and benefits of physics to human lives, it is necessary to inculcate physics entrepreneurship education in the curriculum of all levels of education. Hence, amidst a backdrop of uncertainties in Nigeria, the integration of physics into entrepreneurship education presents a promising avenue for fostering innovation and resilience among aspiring entrepreneurs.

Entrepreneurship education is defined as training acquired by individuals in an organized method through knowledge, skills, and attitudes necessary for engaging in entrepreneurial activities. According to Steenekamp (2020), who opined that entrepreneurship education encompasses the development of behaviours and capacities that can be applied throughout an individual's career as an entrepreneur. This includes not only the technical skills required to start and manage a business but also include adaptability, resilience, and problem-solving that are crucial in traversing the complexities of the entrepreneurial landscape. Entrepreneurship education is vital for preparing individuals with the necessary tools to flourish in dynamic and uncertain economic environment, promoting

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not only personal and professional growth but also contributing to broader economic development (Fayolle & Gailly, 2008). Jones & Iredale (2010) equally viewed entrepreneurship education as being recognized for its multifaceted approach, which can include: education for entrepreneurship, education about entrepreneurship, education through entrepreneurship, and education in entrepreneurship. Each of these categories serves different purposes, from preparing individuals to start their own businesses to inculcating an entrepreneurial spirit that can be applied in various professional settings.

Because of high rate of unemployment in Nigeria and in order to create employment for graduates from secondary schools and tertiary institutions, Nigerian education curriculum has been reviewed to include entrepreneurship education. This was done in order to ensure that graduates acquire suitable entrepreneurial skills for economic enablement that contribute to national development. The implication is that entrepreneurship education serves as a pivot that prepares and inculcates in graduates the entrepreneurial knowledge and skills that makes them to be self-reliant (Agommuoh & Joseph-Kalu).

Statement of the Problem

The research work addresses a significant gap in the educational context vis-à-vis the integration of physics and entrepreneurship. With critical role physics plays in national development and scientific disciplines, there is a noticeable deficiency in the practical entrepreneurial skills acquired by physics students at secondary school level in Nigeria. This deficiency is aggravated by the current economic uncertainties in Nigeria, which necessitate a robust educational approach that equips students with practical skills that can enhance students' entrepreneurial potentials. Allison et al (2023) highlights that while physics teachers employed teaching strategies for topics with entrepreneurial skills so as to enable physics students to be exposed to entrepreneurial skills, there is need for its integration into entrepreneurship education. Therefore, the study emphasizes the urgent need to harness physics education as a means for entrepreneurship in Nigeria, particularly in current economic challenges to ensure that students develop the practical skills necessary for entrepreneurial success.

Empirical Studies on Entrepreneurship Education

Entrepreneurship education is very important in the curriculum of all subjects in Nigeria as it gives the information needed to be self-reliance and self-dependent. Rinji (2013) defined entrepreneurship education has been important in the lives of Nigerians since it educates individual on how it will help him develop the needed skills in managing business venture. Once the necessary education has been acquired within and outside the walls of the classroom, then one can set up a business of his own. Alakaleek et al (2023) conducted a research on impact of entrepreneurship education on entrepreneurial skills. The study examines the effects of entrepreneurship education on students' entrepreneurial skills and intentions. The findings showed that though entrepreneurship education increased students' knowledge and behavior, but there were no significant changes in their entrepreneurial skills and intentions. This suggests the need for more practical approaches through integration of physics in entrepreneurship education to enhance skill development.

In the similar study on impact of physics-based entrepreneurship education conducted by Adebayo et al (2024) that investigated the influence of integrating entrepreneurship education into physics courses on students' entrepreneurial intentions at Nigerian universities. The findings showed that exposure to physics-based entrepreneurship education significantly enhanced students' intentions to pursue entrepreneurial careers, emphasizing the importance of interdisciplinary approaches in shaping entrepreneurial mindsets.

The work of Samra et al (2020) which investigated creativity abilities of students and teaching for creativity: a comparative study of public and private schools of Lahore city revealed that teachers in private schools use methods and techniques for teaching creativity more effectively than teachers from public schools. Afsar and Anjum (2021) on comparison of public and private secondary school teachers' perception about creativity as a cultivated skill in the classroom practices showed that private school teachers' perceptions on creativity in classroom practices are stronger than their counterparts from public school teachers. The teachers' perception on entrepreneurship education could also be seen in the work on Sumarno et al (2023) on the comparison analysis of teachers' learning effectiveness in realizing entrepreneurship skills of students. The study showed that the pedagogical competence of public school teachers in learning entrepreneurship subject is greater and better than their counterparts from private school.

Research Purpose

The main purpose of this study was to explore physics for entrepreneurial education in era of uncertainties. Specifically, the study will determine:

Secondary school physics teachers' perceptions on entrepreneurial skills in physics for integration into entrepreneurial education.

Research question

This study was guided by this research question:

What is the level secondary school teachers' perception on entrepreneurial skills in physics for integration into entrepreneurship education?

Research Hypothesis

The research hypothesis was tested in this study at 0.05 level of significant.

There is no significant difference in perception of entrepreneurial skills in physics for integration into entrepreneurship education based on school type

Research Method

This study is employed a descriptive survey design. The study was carried out in Irepodun Local Government Area of Kwara State. The population of the study was all teachers in the selected local government. The target population was all 56 physics teachers from public and private secondary schools, while 40 physics teachers was selected for the study using proportionate sample technique. One research question was raised and one corresponding research hypothesis was formulated using descriptive and inferential statistics. A researcher designed questionnaire of four (4) Likert scale was used to collect data from the participants. The questionnaire contains two sections, A and B. Section A sought for the information of the demographic data of the respondents, while section B sought for the perception of entrepreneurial skills in physics for integration into entrepreneurship education of the respondents. Section B contains statements on entrepreneurial skill in physics which had four options of Strongly Disagree (SD), Disagree (D), Agree (A), and Strongly Agree (SA). In the Likert Scale, an average mean of 2.50 was used as a benchmark for the mean to be considered as agreement and disagreement. Data collected was analyzed using mean for the research question, while the corresponding hypothesis was tested at 0.05 level of significance using independent *t*-test statistics.

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Data Analysis

The results of the data collected using mean scores and independent *t*-test values of teachers' perception of entrepreneurial skills in physics for integration into entrepreneurship education.

The result in table 1 showed that all items had mean scores that ranges between 3.15 and 3.68 which is greater than 2.50 of average mean score value of the four point scale adopted. Therefore, it could be generally stated that physics teachers integrate entrepreneurial skills in physics into entrepreneurship education as all the statement have the grand mean of 3.42, while the grand standard deviation is 9.47.

Table 1

Mean and Standard Deviation of Physics Teachers' Perception on Entrepreneurial Skills in Physics

S/N	ITEMS	Mean	S.D	Decision
1	Assessing entrepreneurial skills in physics is challenging due to lack of clear criteria	3.15	0.36	Agreed
2	I have the necessary knowledge and skills to teach entrepreneurial skills in physics	3.68	0.47	Agreed
3	I am motivated to learn more about teaching entrepreneurial skills in physics	3.30	0.46	Agreed
4	I currently integrate entrepreneurial skills into my physics teaching practices	3.20	0.46	Agreed
5	Creativity in physics education is relevant to entrepreneurial skills	3.43	0.50	Agreed
6	I believe that entrepreneurial skills can be developed through physics education	3.45	0.50	Agreed
7	I have received sufficient training to teach entrepreneurial skills in physics	3.48	0.59	Agreed
8	I believe entrepreneurial skills are essential for physics students to succeed in their future careers	3.53	0.51	Agreed
9	I agree that entrepreneurial skills learned in physics can be applied to real-world situations	3.45	0.50	Agreed
10	Incorporating entrepreneurial skills into physics education improves student engagement	3.50	0.51	Agreed
	Grand Mean	**3.42**	**0.47**	**Agreed**

Table 2 showed the result of the difference in perception of entrepreneurial skills in physics based on school types. The independent sample t-test results indicate that the t-value ($t(40) = 2.37$, $p < 0.02$). Since the p-value of .02 is less than 0.05 alpha level. However, the mean score for public schools was 32.23 and the mean score for private schools was 33.80 respectively. This signifies that there was statistical significant difference in the perception of entrepreneurial skills in physics based on school types. The negative sign indicates that the mean perception score for public teachers is lower than that for private teachers.

Table 2

Difference in Perception of Entrepreneurial Skills in Physics Based on School Types

	School	N	Mean	S.D	*t*	*df*	Sig.	Decision
Perception	Public	30	32.23	1.94	-2.37	38	.02	**Rejected**
	Private	10	33.80	1.31				

$p < 0.05$

Discussion

It is shown from table 1 that all the listed items are greater than 2.50 mean score of the four point scale used. This infers that teachers from both public and private school integrate entrepreneurial skills in physics into entrepreneurship education. This result is in agreement with Adebayo et al (2024) that exposing students to physics-based entrepreneurship education could enhance their intentions of entrepreneurial careers. It could be seen from the result of the finding in table 2 which showed significant difference in perception of entrepreneurial skills in physics for integration into entrepreneurship education based on school type. The result indicated that private school teachers perceived entrepreneurial skills in physics on its integration into entrepreneurship education than the teachers from public schools in Irepodun Local Government Area. The finding is in agreement with Samra et al (2020) that teachers from private schools use methods and techniques for teaching creativity than teachers from public schools. The result of the finding also commensurate with the finding of Afsar and Anjum (2021) that creativity in classroom practices favour teachers from private school than that from public schools. Contrary to the finding from this study is the work of Sumarno et al (2023) which showed that public teachers possesses pedagogical competence in learning entrepreneurship subjects than teachers from private school.

Conclusion

The findings of this study showed statistical significant difference in perception of entrepreneurial skills in physics between public and private schools teachers in favour of the private schools teachers. This study concluded that resources available in private schools could foster more positive perception of entrepreneurial skills in physics. However, understanding the underlying reasons for the difference could help in developing interventions to enhance entrepreneurial skill awareness and training among public schools teachers. By leveraging on physics to teach critical thinking, problem-solving, and technological applications, the intending entrepreneurs can develop strong skill for dynamic market conditions and sustainable growth. Further studies should be carried out to explore the specific elements within school types that influence these perceptions and potential impact on student.

Recommendations

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

1. It is recommended that government should fund seminars and workshops on entrepreneurial skills in physics that would enhanced the public school teachers' understanding in integrating them into entrepreneurial education.
2. It is also recommended that there should be strong synergy between teachers in public and private schools in order to facilitate knowledge sharing regarding entrepreneurial skill development.

References

Adebayo, A. A., Ojo, J. A., & Akinola, O. (2024). The influence of entrepreneurship education on students' entrepreneurial intentions in Nigerian universities. *International Journal of Entrepreneurship and Small Business, 42*(1), 45-58. https://doi.org/10.1504/IJESB.2024.10029573

African Development Bank [AfDB], (2020). Nigeria country strategy paper 2020-2024. Retrieved from https://www.afdb.org/sites/default/files/documents/projects-and-operations/nigeria_country_strategy_paper_2020-2024_0.pdf

Afsar, S., & Anjum, B. K. (2021). Comparison of public and private secondary school teachers' perception about creativity as a cultivated skill in the classroom practices. *PJER, 4*(3), 212-222.

Agommuoh, P. C. & Joseph-Kalu, N. (2020). Acquisition of entrepreneurial skills: a pedagogical re-orientation for physics teachers. *Rivers State University Journal of Education (RSUJOE), 23*(1&2), 190-199.

Alakaleek, W., Harb, Y., Harb, A. A., & Al shishany, A. (2023). The impact of entrepreneurship education: A study of entrepreneurial outcomes. *The International Journal of Management Education, 21*(2). doi.org/10.1016/j.ijme.2023.100800

Allison, M. T., Naade, N. B., & Adolphus, T. (2023). Entrepreneurial skills in physics: evaluating secondary school teachers' and students' experiences in secondary schools in River state. *River State University Journal of Education (RSUJOE), 26*(2), 216-229. Retrieved from https://rsujoe.com.ng/index.php/joe/article/view/180

Amadalo, M. M., Ocholla, A. A., & Memba, E. B. (2012). Effect of practical work in physics on girls' performance, attitude and skills acquisition in the two-form three secondary schools' transition in Kenya. *International Journal of Humanities and Social Science, 2*(23), 151-166.

Anon (2022). Study.com. https://study.com/learn/lesson/what-is-physics-branches.html

Attique-Khan, M. (2023). The importance of physics to man and the society. LinkedIn

Britannica. (2024). Physics: definition, types, topics, importance, & facts. Retrieved from https://www.britannica.com/science/physics-science

Fayolle, A., & Gailly, B. (2008). From craft to science: teaching models and learning processes in entrepreneurship education. *Journal of European Industrial Training, 32*(7), 569-593.

Financial Nigeria (2024). Nigeria and the world in 2024. Retrieved from https://www.financialnigeria.com/nigeria-and-the-world-in-2024-feature-541.html

Jones, B., & Iredale, N. (2010). Enterprise education as a catalyst for student engagement: a case study of the University of Plymouth. *Education + Training, 52*(1), 8-21.

Ma, C. (2020). Functional physics education as a means of national transformation. *Journal of Science Education and Technology, 29*(6), 789-795.

Nigerian Economic Summit Group [NESG] (2024). Macro outlook: Nigeria's economic landscape in 2024. Retrieved from https://nesgroup.org/download_resource_documents/2024%20Macro%20Outlook%20-%20Original%20Design%2B_1706047914.pdf

Rinji, D. G. (2013). The use of information and communication technologies (ICTS) for entrepreneurship education for youth empowerment in Nigeria. *The International Journal of Education Studies (IJES), 1*(3), 64-71.

Samra, B., Humera, A., & Syeda, B. B. (2020). Creative abilities of students and teaching for creativity: a comparative study of public and private schools in Lahore city. *Journal of Arts and Social Sciences, 7*(2), 35-42.

Steenekamp, H. (2020). Entrepreneurship education: a comprehensive approach. *International Journal of Entrepreneurship and Small Business, 41*(3), 345-360.

Sumarno., Gimin., & Noviana, E. (2023). The comparison analysis of teacher's learning effectiveness in realizing entrepreneurship skills of students. *International Journal of Instruction, 16*(2), 679-702. https://doi.org/10.29333/iji.2023.16236a

Utibe, U. J., & Agah, J. J. (2014). Entrepreneurship development using physics education. *International Journal of Extensive Research. 2,* 1-6.