Assessing the Entrepreneurial Mindset of In-Service Science Teachers in Kogi State, Nigeria

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Abstract

Entrepreneurship education is vital for Nigeria's economic growth and innovation. However, the effectiveness of entrepreneurship education in Nigeria is highly dependent on the capacity of teachers to impart entrepreneurial knowledge and skills to their students. Despite the importance of entrepreneurship education, there is dearth of research on the entrepreneurial mindset of in-service science teachers in Nigeria. Teachers' deficiency in entrepreneurial knowledge and skills hinders students' entrepreneurial mindset development, affecting Nigeria's economic growth. This study assessed the Entrepreneurial Mindset of In-service Science Teachers in Kogi State, Nigeria. The study was guided by four objectives and research questions. A descriptive survey research design was employed. The population of the study comprised all in-service science teachers in Kogi State, with a total population of eight hundred and fifty (850). A stratified sampling technique was used to selected 120 in-service science teachers who have a diverse range of backgrounds and experiences in terms of age, gender, educational background, and prior exposure to entrepreneurship, and were used as sample for the study. The instrument used for data collection was structured questionnaire. The instrument was duly validated, pilot tested and the reliability coefficient of the instrument was found to be 0.86. The data obtained from the administration of the instrument were collated and subjected to data analysis using SPSS statistical package version 25.0. The findings revealed that in-service science teachers have moderate levels of entrepreneurial mindset and skills. Furthermore, the study identified key strategies for fostering entrepreneurial mindset development, including mentorship programs, hands-on entrepreneurial projects, professional development work, entrepreneurship courses, training programs, collaboration with industry experts, and entrepreneurial project-based learning. The findings also

revealed significant challenges faced by in-service science teachers, including inadequate resources, insufficient training and limited support. The study recommended among others that, entrepreneurship courses or workshops should be organized for in-service science teachers to enhance their understanding of business concepts and innovative thinking.

Keywords: Assessing, Entrepreneurial Mindset, In-service Teachers

Introduction

In the 21st century, there is a growing demand for expertise in science, technology, engineering, and mathematics (STEM), making the improvement of STEM education a critical priority in educational reforms globally. STEM education plays a vital role in preparing students for the modern workforce, where innovation and entrepreneurship are increasingly valued (Timberley, 2020). According to Timberley (2020), STEM education equips students with essential skills in science, technology, engineering, fostering critical thinking, problem-solving, enhancing global competitiveness, promoting diversity and inclusion, and innovation. Nelson (2020) asserts that, STEM education cultivates a spirit of innovation and entrepreneurship by encouraging students to explore new ideas, experiment, and think outside the box. Additionally, Nelson (2020) highlights that innovation is crucial for economic growth and societal progress, positioning STEM education as a catalyst for positive change. In today's fast-paced, technology-driven world, a foundation in STEM subjects is vital for individual success and national competitiveness.

Despite the recognized importance of STEM education, educators encounter persistent challenges in effectively delivering the curriculum and engaging students. Study by Weng, Jong, and Chiu (2019) highlights that teachers struggle with outdated teaching methods, limited resources, and a lack of emphasis on real-world applications of STEM concepts, hindering student interest and performance in these critical subjects. Consequently, graduates may enter the workforce without the requisite skills and mindset to excel in dynamic, innovation-driven environments. Weng, Jong, and Chiu (2020) further underscore the existence of achievement gaps among students, particularly in underrepresented and underserved communities, due to inequities in access to quality STEM instruction, resources, and opportunities. Moreover, findings by Weng et al., (2020) indicate a shortage of qualified STEM teachers in many schools, posing challenges to delivering high-quality STEM education.

Geng, Jong, and Chai (2019), identified key challenges faced by teachers, including insufficient Pedagogical Content Knowledge (PCK) for interdisciplinary learning and a lack of instructional designs that promote STEM disciplines. Building on this, Weng et al., (2020) highlighted the primary obstacles encountered by in-service science teachers, which included inadequate Pedagogical Content Knowledge (PCK), a lack of external support, and limited exposure to STEM education. In response to these challenges, it becomes imperative to foster an entrepreneurial mindset among educators, particularly within the realm of STEM education, as emphasized by the National Academies of Sciences, Engineering, and Medicine (NASEM, 2019). National Academies of Sciences, Engineering, and Medicine (NASEM, 2019) asserts that, cultivating an entrepreneurial mindset among STEM educators is essential for fostering innovation, creativity, and problem-solving skills, particularly among in-service science teachers.

Entrepreneurial mindset is characterized by creativity, risk-taking, problem-solving, resilience, adaptability, and a proactive attitude towards challenges and opportunities (Kuratko, 2019). In the context of education, Nelson (2020) suggests that fostering an entrepreneurial mindset requires encouraging students to think creatively, take risks, and develop innovative solutions. Ma and Liu (2020) opined that, integrating an entrepreneurial mindset into STEM education can enhance student learning outcomes by promoting a deep understanding of STEM concepts, encouraging creativity and innovation, and preparing students for the unpredictable demands of the modern workforce. By instilling traits like risk-taking and problem-solving early on, students are better equipped to succeed in a rapidly evolving, technology-driven world (Wang, Tang, & Yin, 2021).

Guzey (2016) opines that developing an entrepreneurial mindset among educators enhance the quality of STEM programs by fostering innovation, creativity, and problem-solving skills. Similarly, Marulcu and Barnett (2016) suggests that teachers with an entrepreneurial mindset are better equipped to integrate science and engineering concepts in a meaningful way, encouraging students to explore the connections between different STEM subjects. This approach not only enhances students' motivation to learn science but also reinforces their conceptual understanding of scientific principles. Wagner (2016) revealed that students who develop entrepreneurial mindset tend to perform better academically and professionally. Moreover, teachers with entrepreneurial mindset are better equipped to create innovative learning experiences (Burgoyne, 2020). In a recent study conducted by Ma and Liu (2020), it was demonstrated that integrating entrepreneurship

principles into STEM education can increase students' engagement, motivation, and confidence in applying STEM concepts to real-world challenges. Additionally, Wang, Tang, and Yin (2021) emphasized. the positive impact of developing an entrepreneurial mindset in STEM education. They found that students who developed an entrepreneurial mindset exhibited higher levels of creativity, problem-solving abilities, and adaptability, leading to improved academic performance and readiness for future careers.

Effective in-service science teacher professional development programs should equip educators with the knowledge and skills to integrate entrepreneurial mindset principles into their teaching (DeCoito, 2020). This includes training in active learning strategies, project-based learning, and the use of real-world examples to engage students in science subjects. Traditionally, in-service science teacher professional development programs have focused on developing subject matter expertise rather than entrepreneurial skills (Guzey, 2019). However, Nelson (2020) suggests that professional development programs such as hands-on experiences, courses, training modules, internships, and mentorship programs can play a critical role in developing entrepreneurial mindset in in-service science teachers. Wagner (2020) revealed that in-service science teacher professional development programs should include courses and training modules that focus on content knowledge, pedagogical skills, and entrepreneurial mindset. Based on this background, therefore, this study assessed the entrepreneurial mindset of in-service science teachers in Kogi State, Nigeria.

Theoretical Framework

This study is hinged on entrepreneurial mindset theory by Kuratko (2009). The theory states that integrating entrepreneurial mindset to teaching and learning helps to equip students with the knowledge, skills, and mindset needed to thrive in an increasingly complex and technology-driven world. The theory encompasses five key dimensions that characterize an entrepreneurial mindset. These include traits such as creativity, adaptability, Proactiveness, resilience, and a willingness to take risks. These dimensions are interconnected and influence one another, forming a mindset that enables individuals to navigate complex situations, identify opportunities, and create value. The theory also highlights the importance of cognitive factors such as opportunity recognition, problem-solving skills, and decision-making in fostering an entrepreneurial mindset. Kuratko's theory emphasizes that an entrepreneurial mindset is not solely reserved for entrepreneurs, but can be developed and applied by anyone, including educators, to enhance their

professional practices and create innovative learning environments. Kuratko's theory inspires teachers to embrace an entrepreneurial mindset, leading to more effective and innovative teaching practices.

The Kuratko's theory is related to this study in that, educators can design learning experiences that encourage creativity and innovation among students, by incorporating problem-solving activities into the curriculum, educators can help students develop their ability to identify and address challenges effectively, encouraging a growth mindset, where students believe in their ability to learn and improve over time, can pave the way for an entrepreneurial mindset. Additionally, integrating the principles of the entrepreneurial mindset theory into teaching and learning can help prepare students to navigate the complexities of the modern world and equip them with the skills and mindset needed for success in entrepreneurship and beyond. By adopting an entrepreneurial mindset, teachers can enhance student engagement and motivation, develop innovative learning environments, foster creativity, critical thinking, problem-solving skills, and prepare students for success in an ever-changing world.

Purpose of the Study

The purpose of the study was to assess the entrepreneurial mindset of in-service science teachers in Kogi State, Nigeria. Specifically, the objectives of the study were to:

1. assess the current level of entrepreneurial mindset among in-service science teachers in Kogi State.
2. Identify effective interventions for fostering entrepreneurial mindset development among in-service science teachers in Kogi State.
3. identify the challenges and barriers faced by in-service science teachers in Kogi State among developing an entrepreneurial mindset.
4. explore effective strategies and best practices for integrating entrepreneurial mindset development into teacher education programs for in-service science teachers in Kogi State.

Research Questions

The study was guided by the following research questions:

1. What is the current level of entrepreneurial mindset and skills among in-service science teachers in Kogi State?
2. What are the effective interventions for fostering entrepreneurial mindset development among in-service science teachers in Kogi State?

3. What are the challenges and barriers faced by in-service science teachers in Kogi State in developing an entrepreneurial mindset?
4. How can teacher education programs better integrate entrepreneurial mindset development into the curriculum for in-service science teachers in Kogi State?

Significance of the study

The study's findings would be highly beneficial to various stakeholders in the field of science education. Firstly, the study would enhance student learning outcomes by promoting hands-on, project-based learning experiences that develop problem-solving, critical thinking, and creativity skills. This would enable students to become more engaged and proficient in their academic pursuits. Secondly, the study would help teachers recognize the importance of integrating an entrepreneurial mindset into teacher education programs. By doing so, teachers would be better equipped to foster innovation and entrepreneurship in their students, preparing them for the challenges of the modern workforce. Thirdly, the study would assist policymakers in making informed education policy decisions that emphasize the importance of integrating an entrepreneurial mindset into teacher education and science education. This would ensure that students are adequately prepared for future careers in their fields. Curriculum developers can create content that addresses the needs of the industry, making the curriculum more relevant and useful for students. Professional Bodies such as STAN and MAN would benefit by organizing workshops on the development of an entrepreneurial mindset in in-service teachers, enhancing teacher professionalism and promoting entrepreneurship education. The study's findings would also help researchers gain a deeper understanding of the entrepreneurial mindset development process, leading to more effective interventions and programs. Textbook publishers can enhance their content by incorporating entrepreneurial mindset development, making their textbooks more engaging and effective. Lastly, the study's findings would contribute to economic growth by preparing a workforce with the skills and mindset required to drive innovation and entrepreneurship. This would be a significant step in fostering a culture of innovation and entrepreneurship, ultimately benefiting society as a whole.

Methodology

The study employed descriptive survey research design. The population of the study comprised all in-service science teachers in Kogi State, with a total population of eight hundred and fifty (850). A stratified sampling technique was employed to select a representative sample of

120 in-service science teachers from Kogi State, Nigeria. The state was divided into three senatorial districts: Kogi East Senatorial District with 9 Local Government Areas, Kogi Central Senatorial District with 10 Local Government Areas, and Kogi West Senatorial District with 11 Local Government Areas. Each district was treated as a stratum, ensuring representation from diverse geographical locations. Within each stratum, a proportional sample of in-service science teachers was selected based on age, gender, educational background, and prior exposure to entrepreneurship, ensuring a diverse range of backgrounds and experiences within the sample. The sample size was allocated equally across the three senatorial districts, with 40 teachers selected from each of Kogi East, Kogi Central, and Kogi West Senatorial Districts. This ensured equal representation and a total sample size of 120 teachers.

The instrument used for data collection was structured questionnaire. The structured questionnaire is divided into two sections (A & B). Section A consists of the demographic and socio-economic characteristics of the respondents, while section B consists of information on assessing the entrepreneurial mindset among in-service science teachers in Kogi State. The structured questionnaire was designed in line with the objectives and research questions, and was structured based on a five-point Likert scale as follows: Strongly Agree (SA), Agree (A), Undecided (UD), Disagree (D), and Strongly Disagree (SD), with numerical values of 4, 3, 2, and 1 respectively. However, research question one was based on five-point Likert scale as follows: Highly Frequent (HF), Very Frequent (VF), Moderately Frequent (MF), Slightly Frequent (SF), and Not Frequent (NF). with numerical values of 5, 4, 3, 2, and 1 respectively, while research questions two-four were based on Strongly Agree (SA), Agree (A), Undecided (UD), Disagree (D), and Strongly Disagree (SD). The respondents were instructed to read the instructions on the structured Questionnaire and to respond appropriately depending on what they felt about the items. The instrument was duly validated, pilot tested and the reliability coefficient of the instruments were found to be 0.86, 0.84, 0.82 and 0.80. The data obtained from the administration of the instrument were collated and subjected to data analysis using SPSS statistical package version 25.0. The research questions were answered using descriptive statistics such as frequencies and percentages.

Results

Research Question One: What is the current level of entrepreneurial mindset and skills among in-service science teachers in Kogi State?

Research question one was answered using data generated from items 1-4 of the questionnaire. The data was subjected to descriptive statistics frequency and percentages. The summary of the analysis is presented in Table 1.

Table 1: Summary of Frequency and Percentage Analysis on the Current Level of Entrepreneurial Mindset and Skills

S/N	Items	HF F(%)	VF F(%)	MF F(%)	SF F(%)	NF F(%)	Decision
1	How often do you engage in creative problem-solving, and identifying new opportunities for teaching and learning?	7(5.83)	10(8.33)	95(79.17)	8(6.67)		Moderately frequent
2	How often do you take calculated risks to innovate in your teaching methods?	5(4.17)	12(10.0)	93(77.50)	10(8.33)		Moderately frequent
3	How often do you collaborate with others to develop new ideas for teaching and learning?	4(3.33)	8(8.67)	97(80.83)	11(9.17)		Moderately frequent
4	How often do you adapt your teaching methods to better meet the needs of your students?		7(5.83)	94(78.33)	14(11.67)	5(4.17)	Moderately frequent

Key: Highly Frequent (HF), Very Frequent (VF), Moderately Frequent (MF), Slightly Frequent (SF), and Not Frequent (NF)

Table 1 shows the summary of the frequencies and percentages analysis on the current level of entrepreneurial mindset and skills among in-service science teachers. Table 1 revealed that 7(5.83%) of the respondents engage in creative problem-solving, and identifying new opportunities for teaching and learning highly frequent, 10(8.33%) very frequent, 95(79.17%) Moderately frequent, and 8(6.67%) slightly frequent. Table 1 also revealed that 5(4.17%) of the respondents take calculated risks to innovate in their teaching methods highly frequent, 12(10.0%) very frequent, 93(77.50%) moderately frequent, 10(8.33%) slightly frequent. Moreso, Table 1 showed that 4(3.33%) of the respondents collaborate with others to develop new ideas for teaching and learning highly frequent, 8(8.67%) very frequent, 97(80.83%) moderately frequent, 11(9.17%) slightly frequent. Additionally, it was also revealed that 7(5.83%) of the respondents adapt their teaching methods to better meet the needs of the students very frequent, 94(78.33%) moderately

frequent, 14(11.67%) slightly frequent and 5(4.17%) not frequent. Based on the results in Table 1, it implies that in-service science teachers have moderate levels of entrepreneurial mindset and skills.

Research Question Two: What are the effective interventions for fostering entrepreneurial mindset development among in-service science teachers in Kogi State?

Research question two was answered using data obtained from items 5-8 of the questionnaire. The data was subjected to descriptive statistics of frequency and percentages. The summary of the analysis is shown in Table 2.

Table 2: Summary of Frequency and Percentage Analysis on the Interventions can be Designed and Implemented to Foster Entrepreneurial Mindset Development

S/N	Items	SA F(%)	A F(%)	D F(%)	SD F(%)	Decision
5	Mentoring programs with experienced entrepreneurs and science professionals would significantly enhance entrepreneurial mindset development among in-service science teachers	30(25.0)	75(62.50)	15(12.50)		Agree
6	Incorporating hands-on entrepreneurial projects in the science teacher training curriculum would foster entrepreneurial mindset development among in-service science teachers	33(27.50)	78(65.0)	9(7.5)		Agree
7	Professional development workshops focused on entrepreneurship education are highly valuable in fostering entrepreneurial mindset development among in-service science teachers	76(63.33)	36(30.0)	8(6.67)		Strongly Agree
8	Collaborations with local businesses and industry partners to develop project-based learning experiences would significantly contribute to developing entrepreneurial mindset among in-service science teachers	68(56.67)	52(43.33)	10(8.33)		Strongly Agree

Table 2 shows the summary of the frequencies and percentages analysis on the interventions can be designed and implemented to foster entrepreneurial mindset development in in-service science teachers. Table 2 revealed that 30(25.0%) and 75(62.50%) of the respondents strongly agreed and

agreed that mentoring programs with experienced entrepreneurs and science professionals would significantly enhance entrepreneurial mindset development in in-service science teachers, while 15(12.50%) disagreed. Table 2 also revealed that 33(27.50%) and 78(65.0%) of the respondents strongly agreed and agreed that incorporating hands-on entrepreneurial projects in the science teacher training curriculum would foster entrepreneurial mindset development in in-service science teachers, while 9(7.5%) disagreed. Moreso, it was showed that 76(63.33%) and 36(30.0%) of the respondents strongly agreed and agreed that professional development workshops focused on entrepreneurship education are highly valuable in fostering entrepreneurial mindset development in in-service science teachers, while 8(6.67%) disagreed. Additionally, Table 2 further revealed that 68(56.67%) and 52(43.33%) of the respondents strongly agreed and agreed that collaborations with local businesses and industry partners to develop project-based learning experiences would significantly contribute to developing entrepreneurial mindset in in-service science teachers, while 10(8.33%) disagreed. Based on the results in Table 2, it implies that mentorship programs, hands-on entrepreneurial projects, professional development work, entrepreneurship courses, training programs, collaboration with industry experts, and entrepreneurial project-based learning interventions are effective in fostering entrepreneurial mindset development in in-service.

Research Question Three: What are the challenges and barriers faced by in-service science teachers in developing an entrepreneurial mindset?

Research question three was answered using data generated from items 9-12 of the questionnaire. The data was subjected to descriptive statistics of frequency and percentages. The summary of the analysis is presented in Table 3.

Table 3: Summary of Frequency and Percentage Analysis of the Challenges and Barriers Faced by In-service Science Teachers

S/N	Items	SA F(%)	A F(%)	D F(%)	SD F(%)	Decision
9	Limited access to entrepreneurship education resources hinders the development of entrepreneurial mindset among in-service science teachers	45(37.5)	68(56.67)	7(5.83)		Agree
10	Insufficient training on integrating entrepreneurship into STEM education programs is a major	58(48.33)	56(46.67)	4(3.33)	2(1.67)	Strongly Agree

	challenge for in-service science teachers in developing an entrepreneurial mindset					
11	Limited opportunities for collaboration with industry experts hinder the development of entrepreneurial mindset among in-service science teachers	60(50.0)	57(47.50)	2(1.67)	1(0.83)	Strongly Agree
12	Lack of practical experience in entrepreneurship poses a significant barrier to the development of entrepreneurial mindset among in-service science teachers	48(40.0)	64(53.33)	5(4.17)	3(2.50)	Agree

Table 3 shows the summary of the frequencies and percentages analysis on the challenges and barriers faced by in-service science teachers in developing an entrepreneurial mindset. Table 3 revealed that 45(37.5%) and 68(56.67%) of the respondents strongly agreed and agreed that limited access to entrepreneurship education resources hinders the development of entrepreneurial mindset, while 7(5.83%) disagreed. Table 3 also revealed that 58(48.33%) and 56(46.67%) of the respondents strongly agreed and agreed that insufficient training on integrating entrepreneurship into STEM education programs is a major challenge for in-service science teachers in developing an entrepreneurial mindset 4(3.33%) and 2(1.67%) disagreed and strongly disagreed. Moreso, Table 3 revealed that 60(50.0%) and 57(47.50%) of the respondents strongly agreed and agreed that limited opportunities for collaboration with industry experts hinder the development of entrepreneurial mindset among in-service science teachers, while 2(1.67%) and 1(0.83%) disagreed and strongly disagreed respectively. Additionally, Table 3 further revealed that 48(40.0%) and 64(53.33%) of the respondents strongly agreed and agreed that lack of practical experience in entrepreneurship poses a significant barrier to the development of entrepreneurial mindset among in-service science teachers, while 5(4.17%) and 3(2.50%) disagreed and strongly disagreed respectively. Based on the results in Table 3, it implies that limited access to resources, lack of practical experience, inadequate training, and limited support are the challenges faced by in-service science teachers.

Research Question Four: How can teacher education programs better integrate entrepreneurial mindset development into the curriculum for in-service science teachers?

Research question four was answered using data generated from items 13-15 of the questionnaire. The data was subjected to descriptive statistics of frequency and percentages. The summary of the analysis is shown in Table 4.

Table 4: Summary of Frequency and Percentage Analysis of the Teacher Education Programs Better Integrate Entrepreneurial Mindset Development into the Curriculum for In-service Science Teachers

S/N	Items	SA F(%)	A F(%)	D F(%)	SD F(%)	Decision
13	Integrating entrepreneurial projects and case studies into existing STEM education courses would be an effective way to develop in-service science Teachers' Entrepreneurial Mindset.	69(57.5)	48(40.0)	3(2.50)		Strongly Agree
14	Teacher education programs should include courses specifically designed to develop Entrepreneurial Mindset skills	54(45.0)	62(51.67)	4(3.33)		Agree
15	Teacher education programs should provide opportunities for in-service science Teachers to engage in innovation challenges and competitions.	71(59.17)	42(35.0)	3(2.50)	4(3.33)	Strongly Agree

Table 4 shows that 69(57.5%) and 48(40.0%) of the respondents strongly agreed and agreed that integrating entrepreneurial projects and case studies into existing STEM education courses would be an effective way to develop in-service science Teachers' Entrepreneurial Mindset, while 3(2.50%) disagreed. Table 4 also revealed that 54(45.0%) and 62(51.67%) of the respondents strongly agreed and agreed that teacher education programs should include courses specifically designed to develop entrepreneurial mindset skills, while 4(3.33%) disagreed. Moreso, Table 4 further revealed that 71(59.17%) and 42(35.0%) of the respondents strongly agreed and agreed that teacher education programs should provide opportunities for in-service science Teachers to engage in innovation challenges and competitions 3(2.50%) and 4(3.33%) disagreed and strongly disagreed respectively.

Discussion of Findings

The findings from research question one as shown in Tables 1 revealed that in-service science teachers have moderate levels of entrepreneurial mindset and skills. This implies that these

educators possess a foundation of innovative thinking, problem-solving abilities, a readiness to explore new ideas and opportunities. This finding is in conformity with that of Guzey (2019) who reported that teachers have moderate levels of entrepreneurial mindset and skills. Furthermore, the results also resonate with the work of Kuratko (2016), who emphasized the importance of cultivating entrepreneurial mindset in teachers to foster innovative learning environments. The moderate levels of entrepreneurial mindset and skills among in-service science teachers underscore the need for targeted interventions and training programs to enhance their entrepreneurial capabilities, ultimately contributing to the development of a more innovative and entrepreneurial education ecosystem.

The findings from research question two as presented in Tables 2 revealed that entrepreneurship courses, training programs, mentorship programs with entrepreneurs or industry experts, experiential learning opportunity and entrepreneurial project-based learning are the interventions needed to foster entrepreneurial mindset development. This finding agrees with that of Nelson (2020) and Wagner (2020) who found that teacher preparation programs such as hands-on experiences, courses, training modules, internships, and mentorship programs can play a critical role in developing entrepreneurial mindset in in-service science teachers. The alignment of these findings highlights the importance of implementing these targeted interventions to enhance the entrepreneurial capabilities of in-service science teachers and ultimately contribute to the development of a more innovative and entrepreneurial STEM education ecosystem.

The result from research question three as shown in Tables 3 showed that limited access to resources, lack of practical experience, inadequate training, and limited support are the challenges faced by in-service science teachers. This finding is in line with that of Weng, Jong, and Chiu (2019) reported that teachers struggle with outdated teaching methods, limited resources, and a lack of emphasis on real-world applications of science concepts, hindering student interest and performance in these critical subjects. Furthermore, these challenges underscore the need for targeted support and resources to equip in-service science teachers with the necessary skills and knowledge to foster entrepreneurial mindset development.

The result from research question four, as presented in Tables 4, revealed that integrating entrepreneurial projects and case studies into existing science education courses would be an effective way to develop In-service Science Teachers' Entrepreneurial Mindset. This finding agrees with that of Ma and Liu (2020), who demonstrated that integrating entrepreneurship

principles into science education can increase students' engagement, motivation, and confidence in applying science concepts to real-world challenges. Moreover, this approach can help bridge the gap between theoretical knowledge and practical application, providing in-service science teachers with the necessary skills and competencies to cultivate entrepreneurial mindset in themselves and their students.

Conclusion

Based on the findings of this study, it was concluded that in-service science teachers in Kogi State, Nigeria, exhibit a moderate level of entrepreneurial mindset. To enhance this mindset, targeted interventions such as mentorship programs, hands-on entrepreneurial projects, professional development work, entrepreneurship courses, training programs, collaboration with industry experts, and entrepreneurial project-based learning are essential. Addressing challenges like limited access to resources, lack of practical experience, inadequate training, and limited support is crucial in fostering a more entrepreneurial mindset among in-service science teachers. By implementing these strategies, educational institutions can empower in-service science teachers to think innovatively, solve problems creatively, and adapt to the evolving demands of the teaching profession. Cultivating an entrepreneurial mindset in in-service science teachers is vital for equipping them with the skills and mindset necessary to thrive in an ever-changing educational landscape and enhance the quality of science education.

Recommendations

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

1. Entrepreneurship courses or workshops should be organized for in-service science teachers to enhance their understanding of business concepts and innovative thinking.
2. Mentorship programs that connect in-service science teachers with entrepreneurs, industry experts, or experienced educators should be established to provide guidance, advice, and real-world insights.
3. Access to entrepreneurship education resources, tools, and materials should be improved to support the development of entrepreneurial mindset and skills among in-service science teachers.

4. Support and guidance should be provided to in-service science teachers as they navigate challenges and opportunities related to entrepreneurship education, ensuring they continue to develop and grow in this area.
5. Opportunities for in-service science teachers to engage in hands-on, practical experiences such as entrepreneurial projects, internships, or science fair organization should be created to apply their knowledge and skills in real-world scenarios.

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