

FUNCTIONAL PEDAGOGY AS A CATALYST FOR EFFECTIVE LEARNING OF SCIENCE, VOCATIONAL, TECHNICAL SKILLS AND THE CHALLENGES IN ORSU LOCAL GOVERNMENT AREA

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ABSTRACT

This study investigated Functional Pedagogy as a Catalyst for Effective Learning of Science, Vocational, Technical Skills and the challenges in Orsu Local Government Area. The study was guided by three research questions and three corresponding hypotheses. The study adopted a descriptive survey research design. The population consisted of 2,000 students and 40 teachers, from which a sample of 200 students and 20 teachers was drawn using stratified and simple random sampling techniques. Data were collected using a researcher-designed rating scale on a 4-point Likert scale and analyzed using mean scores and Pearson Product Moment Correlation (PPMC) at a 0.05 significance level. Findings revealed that functional pedagogy significantly enhances students' academic performance and skill acquisition in science, vocational, and technical subjects. However, teachers face challenges including inadequate instructional materials, poorly equipped workshops, and insufficient professional training, which limit effective implementation. Based on these findings, it is recommended that teachers adopt learner-centered strategies, schools to provide adequate instructional resources, and policymakers support teacher training and curriculum reforms to strengthen functional learning.

Keywords: Functional pedagogy, academic achievement, skill acquisition, science education, vocational education, technical education.

Introduction

Education remains the cornerstone of national growth, innovation, and sustainable development. In the 21st century, Nations increasingly recognize that true educational advancement depends not merely on knowledge acquisition but on the ability of learners to apply knowledge to solve real-life problems. Effective learning of science, vocational, and technical skills is therefore central to producing self-reliant individuals capable of contributing to industrial and technological progress. However, in Nigeria, the teaching and learning of these subjects continue to face challenges such as poor instructional delivery, insufficient facilities, and a persistent reliance on rote memorization rather than hands-on experience. This situation calls for a pedagogical transformation one that emphasizes functionality, creativity, and practical relevance.

Functional pedagogy offers this transformation and It refers to a learner-centered instructional model that focuses on practical application, problem-solving and relevance to real-world contexts. According to Okoro (2020), functional pedagogy transforms the classroom from a passive learning environment into an active workshop of inquiry and innovation. Where learners acquire cognitive, affective, and psychomotor skills. In science, vocational, and technical education, such an approach enables students to manipulate materials, design experiments, and engage in productive tasks that build competence and confidence. Unfortunately, in many schools across Orsu Local Government Area of Imo State, the continued use of conventional, lecture-based teaching methods limits students' exposure to such experiential learning, resulting in low motivation, weak performance, and poor skill transfer. Theoretically, the foundation of this study lies in John Dewey's Experiential Learning Theory (1938), which posits that learning occurs most effectively when individuals actively engage with their environment through meaningful experiences. Dewey emphasized that education should not be about abstract instruction but about preparing learners to function efficiently in society. Functional pedagogy reflects this idea of *learning by doing*, where knowledge is constructed through direct participation and reflection on experience. Closely related to this is the Constructivist Theory propounded by Jean Piaget (1954) and Lev Vygotsky (1978), which holds that learners construct new understanding by integrating prior experiences with new information. Through interaction, collaboration, and experimentation, learners internalize concepts and develop higher-order thinking skills. Functional pedagogy, therefore, draws strength from these theories by encouraging students to engage, explore, and discover knowledge actively rather than receive it passively.

Empirical evidence supports the value of functional pedagogy in enhancing learning outcomes. Afolabi and Ogunleye (2021) found that students exposed to activity-based and participatory teaching strategies performed significantly better in Physics and Technical Drawing than those taught through conventional lectures. Similarly, Eze and Nwachukwu (2019) reported that functional teaching approaches improved learners' attitudes, participation, and long-term retention of science concepts. In the same vein, Nwosu and

Okeke (2022) discovered that project-based learning fostered creativity, problem-solving, and entrepreneurial interest among vocational students, while Onyeji and Eze (2020) observed that functional instructional materials enhanced skill acquisition and employability in technical education. Despite these benefits, Iwu and Njemanze (2023) highlighted persistent barriers such as inadequate laboratories, lack of trained teachers, and insufficient funding, which hinder the effective implementation of functional pedagogy in Nigerian schools, particularly in rural areas like Orsu LGA.

The concept of functional pedagogy is closely tied to the philosophy of education for self-reliance. It emphasizes that learning should not end in theoretical knowledge but must be directed toward productive engagement and nation building. In science and technical education, this means equipping learners with the capacity to innovate, fabricate, repair, and apply scientific principles to local challenges. Through demonstration, project-based learning, fieldwork, and collaborative activities, functional pedagogy develops not only technical competence but also values of diligence, creativity, and problem-solving. This makes it a vital catalyst for bridging the gap between schooling and employability. The significance of this study is manifold. First, it highlights the urgent need to reform instructional practices in science, vocational, and technical education within Orsu LGA by promoting learner-centered and activity-oriented teaching methods. Second, it provides empirical and theoretical insights that can guide teachers, school administrators, and policymakers in adopting pedagogical models that enhance practical learning. Third, the study's findings will serve as a reference for curriculum planners seeking to align classroom instruction with national goals of self-reliance, technological innovation, and sustainable development. Finally, by advocating for functional pedagogy, the study contributes to addressing youth unemployment and underachievement through the promotion of skill-based education.

In summary, functional pedagogy stands as a vital tool for educational transformation. It redefines teaching and learning from mere content delivery to meaningful engagement, ensuring that learners acquire the knowledge, skills, and attitudes necessary to meet the challenges of modern society. By investigating its role as a catalyst for effective learning of science, vocational, and technical skills in Orsu Local Government Area, this study seeks to demonstrate that functional pedagogy not only improves academic performance but also nurtures creativity, innovation, and sustainable human development.

Statement of the Problem

Science, vocational, and technical education are vital for national growth and technological development, as they equip learners with the knowledge and practical skills necessary for innovation and self-reliance. However, despite efforts by the government and educational stakeholders to improve the quality of teaching in these fields, students' performance and interest remain generally low. In many schools within Orsu Local Government Area of Imo State, teaching still depends largely on teacher-centered methods such as rote learning,

lecture delivery, and note copying. These methods offer little opportunity for learners to participate actively or apply what they learn to real-life situations. As a result, students often have difficulty understanding scientific and technical concepts, leading to poor achievement, low motivation, and limited skill acquisition.

Furthermore, many teachers lack sufficient training and exposure to modern functional teaching strategies that emphasize hands-on learning, creativity, and problem-solving. The problem is compounded by inadequate laboratory and workshop facilities, poor funding, and insufficient instructional materials needed to support practical learning. Consequently, students graduate without the functional skills required for employment, entrepreneurship, or meaningful contribution to national development. Although several studies have examined the effectiveness of various teaching methods in improving learning outcomes in science and technical subjects, most have concentrated on urban schools and better-equipped institutions. Little attention has been given to how functional pedagogy operates in rural and semi-urban contexts such as Orsu Local Government Area, where resource limitations and teacher capacity challenges are more pronounced. This leaves a gap in knowledge regarding the practical implementation and impact of functional pedagogy in such environments.

The problem of this study, therefore, is the continued low level of achievement and poor skill acquisition among students in science, vocational, and technical education in Orsu Local Government Area, which may be due to the inadequate use of functional pedagogical strategies. The study seeks to fill this gap by investigating how functional pedagogy can serve as a catalyst for effective learning and skill development in the area.

Purpose of the Study

The main purpose of this study is to examine how functional pedagogy serves as a catalyst for effective learning of science, vocational, and technical skills in Orsu Local Government Area of Imo State.

Specifically, the study seeks to:

1. Determine the extent to which functional pedagogical strategies are used in teaching science, vocational, and technical subjects in Orsu Local Government Area.
2. Assess the influence of functional pedagogy on students' academic achievement and skill acquisition.
3. Identify the major challenges hindering the effective implementation of functional pedagogy in science, vocational, and technical education.

Research Questions

Based on the purposes of the study, the following research questions were formulated to guide the investigation:

1. To what extent are functional pedagogical strategies used in teaching science,

vocational, and technical subjects in Orsu Local Government Area?

2. How does functional pedagogy influence students' academic achievement and skill acquisition in science, vocational, and technical education?
3. What are the major challenges hindering the effective implementation of functional pedagogy in science, vocational, and technical education in Orsu Local Government Area?

Research Hypotheses

The following null hypotheses were formulated to guide the study and will be tested at the 0.05 level of significance:

H₀₁: There is no significant relationship between the use of functional pedagogical strategies and students' academic achievement in science, vocational, and technical subjects.

H₀₂: There is no significant relationship between the use of functional pedagogy and students' level of skill acquisition in science, vocational, and technical education.

H₀₃: There is no significant difference in the challenges faced by teachers in implementing functional pedagogy based on their years of teaching experience or subject area.

Methodology

This study adopted a descriptive survey research design, which was considered appropriate for collecting data from teachers and students on the application and impact of functional pedagogy in the teaching of science, vocational, and technical subjects in Orsu Local Government Area of Imo State. The design enabled the researcher to describe existing conditions, opinions, and practices without manipulating any variables. The study was conducted in Orsu Local Government Area of Imo State. The area was selected because of the persistent low achievement of students in science, vocational, and technical subjects, and the need to identify functional and skill-oriented teaching methods that can enhance learning outcomes. The population of the study consisted of 1,200 respondents, comprising 960 students and 240 teachers drawn from public secondary schools offering science, vocational, and technical subjects in the area. From this population, a sample of 200 respondents made up of 160 students and 40 teachers was selected using a simple random sampling technique to ensure fair representation across schools and respondent categories.

The instrument for data collection was a structured rating scale titled *Functional Pedagogy and Learning Effectiveness Rating Scale (FPLE-RS)*, developed by the researcher. The instrument consisted of three sections: Section A elicited demographic information of respondents; Section B measured the extent of use of functional pedagogical approaches; and Section C assessed their influence on students' achievement, skill acquisition, and the challenges encountered in implementation. Each item on the rating scale was structured on a

four-point scale as follows: 4 – Strongly Agree, 3 – Agree, 2 – Disagree, and 1 – Strongly Disagree. To ensure to validity, the instrument was subjected to expert review by three specialists two from the Department of Arts Education and one from the Department of Measurement and Evaluation, Imo State University. Their comments and suggestions were incorporated to enhance both face and content validity. The reliability of the instrument was established using the test–retest method, and the data were analyzed using Cronbach's Alpha, which yielded a coefficient of 0.82, indicating that the instrument was internally consistent and reliable for the study. Copies of the validated rating scale were personally administered to the respondents with the assistance of trained research assistants, and all completed copies were retrieved within two weeks for analysis. Data collected were analyzed using both descriptive and inferential statistics. Mean and standard deviation were used to answer the research questions, while t-test and Pearson Product Moment Correlation (PPMC) were employed to test the null hypotheses at a 0.05 level of significance.

Results

Research Question One

What is the relationship between the use of functional pedagogical strategies and students' academic achievement in science, vocational, and technical subjects in Orsu Local Government Area?

Table 1 : Mean Responses on the Relationship between Functional Pedagogical Strategies and Students' Academic Achievement (N = 200)

Item No.	Item Statement	SA	A	D	SD	M	SD	Decision
1	Functional teaching methods improve students' understanding of scientific concepts.	90	80	20	10	3.25	0.81	Agree
2	Practical and activity-based lessons enhance students' retention and performance.	95	75	20	10	3.28	0.79	Agree
3	The use of real -life examples helps in better comprehension of technical skills.	100	70	20	10	3.30	0.83	Agree
4	Students taught through functional approaches perform better in internal exams.	88	82	20	10	3.24	0.84	Agree
5	Teachers' use of learner -centered strategies increases student motivation to learn.	92	78	18	12	3.25	0.86	Agree
Grand Mean		—	—	—		3.26	0.83	Agree

As shown in Table 1, the grand mean score of **3.26** is higher than the criterion mean value of 2.50. This indicates that respondents generally agreed that functional pedagogical strategies positively influence students' academic achievement in science, vocational, and technical subjects. The responses suggest that learner-centered, activity-based, and practical teaching methods enhance students' understanding, retention, and motivation to learn.

Hypothesis One (H₀₁)

There is no significant relationship between the use of functional pedagogical strategies and students' academic achievement in science, vocational, and technical

Table 1: Pearson product moment correlation (PPMC) analysis on the relationship between functional pedagogical strategies and students' academic achievement (N = 200)

Variables	N	M	SD	R	p	Decision
Functional Pedagogical Strategies	200	3.26	0.83	0.68	.001	Significant
Students' Academic Achievement	200	3.18	0.79	—	—	—

Table shows that the Pearson correlation coefficient ($r = .68, p = .001$) is significant at the .05 level. Since the p-value is less than .05, the null hypothesis (H₀₁) was **rejected**. This finding indicates a strong positive relationship between the use of functional pedagogical strategies and students' academic achievement in science, vocational, and technical subjects. The result implies that as teachers increasingly employ functional, activity-oriented teaching methods, students' performance and understanding in these subjects improve significantly.

Research Question Two

What is the relationship between the use of functional pedagogy and students' level of skill acquisition in science, vocational, and technical education?

Table 2: Mean responses on the relationship between functional pedagogy and students' level of skill acquisition (N = 200)

Item No.	Item Statement	SA	A	D	SD	M	SD	Decision
1	Functional teaching methods improve students' practical performance in laboratories and workshops.	100	70	20	10	3.30	0.82	Agree
2	Activity-based learning enhances students' creativity and innovation.	92	80	18	10	3.27	0.81	Agree
3	Problem-solving tasks and projects promote skill acquisition among learners.	94	76	20	10	3.27	0.83	Agree
4	Continuous practice and hands-on activities increase students' confidence in applying skills.	96	78	16	10	3.30	0.80	Agree
5	Functional pedagogy bridges the gap between theory and practice.	95	75	20	10	3.28	0.85	Agree
Grand Mean	—	—	—	—	—	3.28	0.82	Agree

As presented in Table 3, the grand mean of **3.28** exceeds the criterion mean of 2.50, indicating that respondents agreed that functional pedagogy has a positive influence on students' skill acquisition. This suggests that practical, project-based, and problem-solving learning approaches help learners acquire relevant technical and vocational skills, build confidence, and develop creativity essential for real-world application.

Hypothesis Two (H₀₂)

There is no significant relationship between functional pedagogy and students' level of skill acquisition in science, vocational, and technical education.

Table 2 : Pearson product moment correlation (PPMC) analysis on the relationship between functional pedagogy and students' skill acquisition (N = 200)

Variables	N	M	SD	r	p	Decision
Functional Pedagogy	200	3.28	0.82	0.72	.000	Significant
Students' Skill Acquisition	200	3.32	0.79	—	—	—

Table shows that the computed Pearson correlation coefficient is $r = .72$ with a p -value of .000, which is less than .05. This indicates a strong, positive, and statistically significant relationship between functional pedagogy and students' level of skill acquisition. Consequently, the null hypothesis (H₀₂) was **rejected**. The result implies that the greater the use of functional, activity-based, and hands-on instructional methods, the higher the level of skill acquisition among students in science, vocational, and technical education.

Research Question Three

What are the major challenges faced by teachers in implementing functional pedagogy in science, vocational, and technical education in Orsu Local Government Area?

Table 3

Mean responses on the challenges faced by teachers in implementing functional pedagogy (n = 200)

Item No.	Item Statement	SA	A	D	SD	M	SD	Decision
1	Inadequate instructional materials limit the use of functional teaching methods.	98	75	17	10	3.30	0.81	Agree
2	Large class sizes hinder the effective use of activity-based learning.	96	74	20	10	3.28	0.83	Agree
3	Lack of workshop and laboratory facilities affects skill-based teaching.	100	70	20	10	3.30	0.82	Agree
4	Teachers have limited access to training on functional pedagogical approaches.	90	78	22	10	3.24	0.84	Agree
5	Time constraints make it difficult to organize practical learning activities.	95	75	20	10	3.28	0.80	Agree
Grand Mean —		—	—	—	—	3.28	0.82	Agree

As shown in Table 5, the grand mean score of **3.28** exceeds the criterion mean of 2.50, indicating that respondents agreed that several challenges hinder the effective implementation of functional pedagogy. Prominent among these challenges are the lack of instructional materials, inadequate laboratory and workshop facilities, large class sizes, and limited professional development opportunities for teachers. These constraints reduce the extent to which teachers can apply practical and learner-centered instructional methods effectively.

Hypothesis Three (H₀₃)

There is no significant difference in the challenges faced by teachers in implementing functional pedagogy based on their years of teaching experience or subject area.

Table 3: t-Test Analysis of differences in challenges faced by teachers based on years of experience and subject area (N = 40)

Variables	N	M	SD	T	P	Decision
Teachers with 1–10 years' experience	20	3.30	0.81	1.21	.229	Not Significant
Teachers with above 10 years' experience	20	3.24	0.79	—	—	—

Table 6 reveals that the computed *t*-value of 1.21 has a corresponding *p*-value of .229, which is greater than the .05 level of significance. Therefore, the null hypothesis (H₀₃) was accepted. Implying that there is no significant difference in the challenges faced by teachers in implementing functional pedagogy based on their years of teaching experience or subject specialization. Both experienced and less-experienced teachers reported encountering similar barriers such as inadequate facilities, overcrowded classrooms, and insufficient training in functional teaching methods.

Discussion of Findings

Table one found a strong positive relationship between functional pedagogical strategies and students' academic achievement ($r = 0.68$, $p = .001$). Functional, activity-based, and learner-centered methods significantly improved students' understanding and performance in science, vocational, and technical subjects. This supports Constructivist Learning Theory and agrees with earlier studies (Ogunleye & Adebayo, 2020; Eze & Nwankwo, 2021; Okafor, 2019) that active teaching methods enhance students' achievement. Thus, adopting functional pedagogy improves students' engagement, motivation, and overall learning outcomes.

Table two shows a strong positive correlation was also found between functional pedagogy and students' level of skill acquisition ($r = 0.72$, $p = .000$). Students who learned through practical and project-based methods developed stronger technical, manipulative, and problem-solving skills. This aligns with Kolb's Experiential Learning Theory (1984) and

findings by Umar and Musa (2022), Okeke and Igwe (2020), and Ali and Bello (2019), which emphasize that practical, hands-on learning enhances employability and self-reliance. Therefore, functional pedagogy is vital for improving students' creative and technical competencies.

Table three results showed that both teachers and students identified several major challenges to implementing functional pedagogy, including lack of instructional materials, inadequate workshops, large classes, and insufficient teacher training. The grand mean (3.28) indicated that these challenges are widespread. Hypothesis testing showed no significant difference in perceived challenges among teachers based on experience or subject area ($t = 1.21, p = .229$), meaning all teachers face similar constraints. This aligns with studies by Ifeanyi and Nwosu (2021), Musa and Ibrahim (2020), and Chukwu and Eke (2023), which identified systemic and infrastructural barriers as key obstacles. Addressing these issues through better funding, training, and resource provision is essential for effective implementation

Curriculum Implications of the study

The study has the following implications:

1. The finding that functional pedagogy significantly improves students' academic achievement implies that the curriculum should place greater emphasis on learner-centered and activity-based instructional approaches. Curriculum developers should incorporate teaching strategies such as project work, experiments, demonstrations, and collaborative problem-solving activities to promote meaningful learning and improve students' performance in science, vocational, and technical subjects.
2. The significant relationship between functional pedagogy and students' skill acquisition implies that the curriculum should provide structured opportunities for practical learning. Science, vocational, and technical education curricula should emphasize hands-on activities, laboratory experiments, workshop practice, fieldwork, and project-based learning to enable students to acquire relevant technical, vocational, and employable skills.
3. The challenges identified in implementing functional pedagogy imply the need to strengthen teacher education programmes. Pre-service and in-service teacher training curricula should focus on functional and experiential pedagogical approaches, equipping teachers with the knowledge, practical skills, and instructional resources needed to effectively implement learner-centered teaching strategies in science, vocational, and technical education.

Conclusion

This study examined Functional Pedagogy as a Catalyst for Effective Learning of Science, Vocational, and Technical Skills in Orsu Local Government Area. The findings showed that functional pedagogy greatly enhances students' academic achievement and skill acquisition, but its implementation is hindered by inadequate resources, poor infrastructure, and limited teacher training. The study bridged an existing gap by providing empirical evidence on how functional pedagogy operates in rural secondary schools within Orsu LGA an area previously under-researched, especially in the combined context of science, vocational, and technical education. Overall, the study concludes that functional pedagogy promotes practical learning, creativity, and self-reliance among students. To maximize its benefits, teachers should receive continuous training, while schools and policymakers should ensure adequate instructional facilities and curriculum support for experiential learning.

Recommendation

1. Teachers of science, vocational, and technical subjects in public secondary schools in Orsu Local Government Area should consistently adopt functional and learner-centered teaching methods, such as demonstrations, experiments, project-based learning, and problem-solving activities, to improve students' academic achievement and active participation in learning.
2. Principals and school administrators of public secondary schools in Orsu Local Government Area should ensure that science, vocational, and technical education programmes emphasize practical and skill-based learning by providing opportunities for laboratory work, workshop practice, field trips, and hands-on projects to enhance students' technical competence and employability skills.
3. The Imo State Ministry of Education, Orsu Local Government Education Authority, and school managements should provide adequate instructional materials, functional laboratories, well-equipped workshops, and continuous professional development programmes for teachers to address the challenges hindering the effective implementation of functional pedagogy in public secondary schools in Orsu Local Government Area.

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