INNOVATIVE INSTRUCTIONAL MODELS AND TEACHERS' PEDAGOGICAL EFFICACY AS CORRELATES OF PRODUCTIVITY AND MOTIVATION AMONG TECHNICAL EDUCATION STUDENTS IN COLLEGES OF EDUCATION IN NORTHWEST NIGERIA

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Abstract

The study was carried out to determine the innovative instructional model and pedagogical efficacy of teachers as correlates of productivity and motivation of Technical Education students in colleges of education in North-West Nigeria. A structured questionnaire with 37 items was used as the instrument for data collection, based on a five-point Likert scale, and subjected to face validation by five experts. The internal consistency of the instrument was established using the Cronbach alpha reliability method, which yielded a coefficient of 0.86. The study adopted a correlation research design, and the sample size consisted of 67 students of Industrial Technical Education in Federal Colleges of Education (Technical) Bichi, Gusau, and Gidan Madi. Data were analyzed using SPSS version 25, and the results revealed that a moderate and positive correlation exists between the innovative instructional model and pedagogical efficacy of teachers, as well as between the innovative instructional model and the productivity of Technical Education students, while a weak and positive correlation was found between the innovative instructional model and students' motivation. Based on these findings, the study recommended the adoption of innovative instructional models and the provision of professional development opportunities for teachers to enhance their pedagogical skills, as this can lead to improved student outcomes. It concludes that the implementation of innovative instructional models in Technical Education faces several challenges but significantly impacts both productivity and motivation among students.

***Keywords*:** Innovative Instructional Model, teacher, productivity, motivation, technical

Introduction

Innovative instructional model is a transformative approach to teaching and learning that leverage technology, flexible pedagogies, and learner-centered strategies to create more

engaging, collaborative, and effective learning experiences. Innovative instructional model aims to foster skills like creativity, critical thinking, and problem-solving that are essential for success in the 21st century knowledge economy (Tan 2021). It empowers Industrial Technical Education students to take an active role in their learning by allowing them to pursue their own practical and provide personalized learning experiences tailored to their needs and preferences. It Promote adaptive, flexible, and collaborative modes of learning, and enables new forms of interaction, communication, and knowledge sharing. Innovative instructional model according to Ahmad (2024) is a Technology-Enabled Learning that leverage digital tools and platforms to support actively and facilitate the creation of virtual learning spaces that transcend physical classroom boundaries.

Technology-Enabled Learning includes; Flipped classroom, Personalized learning or Project-based learning which industrial Technical Education students and teachers need to adopt. Innovative instructional models have great potential to transform education, integrating them into mainstream systems comes with challenges (Horn & Staker 2017). Educators and teacher of Technical Education needs to carefully consider pedagogical issues around data privacy, intellectual property, and educational equity (Vakil 2018). Continued research, dialogue, and innovation of industrial technology students and teachers will be a key to harnessing the full potential of the model, positively, by impact learning and pedagogical efficacy teachers.

Pedagogical efficacy refers to teachers' beliefs in their ability to effectively facilitate learning and manage classroom dynamics. Nwani (2021) buttressed that Pedagogical efficacy encompasses teachers’ confidence in implementing instructional strategies, engaging students, and positively influencing educational outcomes. Pedagogical efficacy is crucial as it directly impacts teaching practices, student motivation, and overall academic achievement of Technical Education students. Pedagogical efficacy is seen by Jacob, John & Gwany (2020) as the knowledge, skills, and attitudes that enable teachers to perform effectively in their roles. It is linked to self-efficacy, a broader concept introduced by Bandura (2012), which emphasizes individuals' beliefs in their capabilities to execute actions required for specific performance. Ihua (2024) stated Teachers with high pedagogical efficacy tend to adopt innovative teaching methods, engage in risk-taking behaviors, and maintain higher standards in their practical classrooms. This, in turn, fosters and stimulates practical activities that can lead to improved Technical Education student practical.

Teachers’ pedagogical efficacy is the ability to engagement Student, adopt instructional strategies and manage classroom effectively to impact on student outcomes. Studies have shown a positive correlation between teacher efficacy and student achievement, motivation, and self-efficacy beliefs (Achufusi & Utaka 2021). Pedagogical efficacy of teacher is influenced by their experience, professional development and pedagogical beliefs. Teachers' underlying experience,

professional development and beliefs about teaching and learning significantly shape their efficacy perceptions and their productivity.

Productivity among Technical Education students encompasses how effectively these students utilize technological tools and resources to enhance their learning outcomes and overall educational experiences. Onyema (2020) poised that Productivity of Technical Education students can be influenced by various factors, including the integration of technology in the classroom, the availability of digital resources, and the pedagogical approaches employed by educators.

Effective incorporation of technology in education, such as Computer-Aided Instruction (CAI), has been shown to significantly improve students' productivity. CAI allows for personalized learning experiences, where students can work independently at their own pace, leading to better engagement and understanding of the material (Odugbemi & Aigboduwa 2023). Technical Education students benefit from access to a wide range of digital tools and resources, including online textbooks, multimedia content, and educational apps to improve their productivity. These resources can streamline lesson preparation and delivery, allowing students to focus more on learning and less on administrative tasks (Olugbenga, Yakubu & Ali 2023).).

Technology enhances productive collaboration among students and between students and teachers. Ability to share resources and ideas digitally fosters a more dynamic learning environment. (Bankole & Olajide (2024) stated that Tools such as learning management systems and communication platforms facilitate real-time interaction and project management, which can lead to improved teamwork and productivity. Training and support for both students and teachers in using technology effectively is crucial, it ultimately leads to improved productivity learning and motivational outcomes.

Motivation among Technical Education students is crucial for their academic success and future careers. Technical Education students can be motivated by both intrinsic factors, such as curiosity and intellectual challenge, as well as extrinsic factors, such as grades, rewards, or avoiding punishment (Amadi & Ogbuoji 2022). Intrinsic motivation is generally more desirable as it leads to deeper engagement, learning and productivity Technical Education students. Orji & Ogbuanya (2022) postulated that allowing students to participate in the projects they work on and the activities they engage in can significantly enhance their motivation which is key to their productivity. Tasks that are appropriately challenging to Technical Education students' skill, or too difficult, motivation may be extrinsic and based on rewards rather than inherent interest (Orji & Ogbuanya 2022).

Connecting Technical Education to real-world applications and future careers helps Technical Education students see the relevance and importance of what they are learning, boosting

motivation. Oyinloye (2022) Creating a supportive, engaging, and technologically-rich classroom environment can foster motivation. Incorporating digital tools and resources in meaningful ways is key. Technical Education students require personalized learning that tailor's instruction and projects to individual interests, strengths, and goals helps maintain motivation. Also incorporating group projects and activities that leverage social interaction and teamwork can enhance motivation (Nweke & Gbarage 2022). Providing appropriate support and scaffolding help, Technical Education students will succeed at challenging tasks and boost their motivation. Also offers timely, constructive feedback, encouragement and helps Technical Education students stay motivated and engaged in the practical activities.

Practical technology activities are essential for engaging college of education students develop real-world skills, through assignments that allow practicing, investigating, designing, decision-making, evaluating and communicating (PIDMEC). Practical technology activities are hands-on activities, it accommodates different learning preferences and help students construct knowledge through doing (Kolb 2017). Practical technology activities of students in college of education, involve a wide range of tools and skills.

As opined by Arruda & Ferreira (2021) they include; using operating systems, learning management systems, and virtual/network systems, selecting appropriate technology for a given task or project, using productivity tools for time management, documentation, organization, sharing/communication, and digital security. Furthermore, Olalude (2023) added Practical technology activities of students as conducting online research and collecting information, creating digital illustrations, models, prototypes, gathering, analyzing and visualizing data. practical activities of students in college of education, ranges from virtual field trips and simulations to game-based learning platforms and collaborative presentations. Provision of necessary facilities, equipment and materials is critical for implementing practical activities.

Statement of the Problem

To establish an effective innovative instructional model and enhance the pedagogical efficacy of teachers in Technical Education, particularly in practical activities for colleges of education. Integration of ideal Framework for Innovative Instructional Model is key through, project-based learning and inquiry-based learning that engage students actively in the learning process, implementing a flipped classroom model where students engage with new content outside of class and use class time for interactive, application-based learning also, technology integration using learning management systems, simulation software, and collaborative platforms that facilitate interaction and feedback among students and instructors. Regular provision of professional development opportunities for teachers to stay updated on innovative teaching strategies and technology integration. This ensures that instructors are well-equipped to

implement new methods, ensuring that curriculum is relevant to current industry standards and practices.

Unfortunately, the implementation of an innovative instructional model for Technical Education in federal colleges of education (T) in North West Nigeria faces several challenges and is significantly impacting pedagogical efficacy of teachers, as well as the productivity and motivation of students. Lack of Infrastructure, Teacher Proficiency, Curriculum Misalignment, Insufficient Support Systems. Lack of institutional support for professional development and collaborative teaching practices has hindered teachers' ability to adopt innovative instructional strategies. Addressing these challenges is essential for the successful implementation of innovative instructional models in Technical Education. By investing in infrastructure, providing professional development for educators, aligning curricula with industry needs, and adopting flexible assessment methods, colleges of education in North West Nigeria can enhance pedagogical efficacy, boost student productivity, and foster greater motivation among students. Therefore, it is on this premise the study seeks to determine Innovative instructional model and pedagogical efficacy of teachers as correlates of productivity and motivation of Technical Education students in practical activities in colleges of education in North-West Nigeria.

Purpose of the Study

The main purpose of the study is Innovative instructional model and pedagogical efficacy of teachers as correlates of productivity and motivation of Technical Education students in practical activities in colleges of education in North-West Nigeria. Specifically, the study seeks to determine the relationship between:

1. Innovative instructional model and pedagogical efficacy of Technical Education teachers in practical activities in North-West Nigeria.
2. Innovative instructional model and productivity of Technical Education students in practical activities in colleges of education in North-West Nigeria.
3. Innovative instructional model and motivation of Technical Education students in practical activities in colleges of education in North-West Nigeria.

Hypotheses

1. There is no significant relationship between Innovative instructional model and pedagogical efficacy of Technical Education teachers in practical activities
2. There is no significant relationship between Innovative instructional model and productivity of Technical Education students in practical activities

3. There is no significant relationship between Innovative instructional model and motivation of Technical Education students in practical activities

Methodology

Design of the Study

The study employed descriptive survey research. A descriptive research design is a systematic research design that seeks information to characterize a phenomenon, situation or population. More specifically, it assists in addressing the what, when where and how questions of the study topic rather than the why (Siedlecki, 2020). Descriptive survey design was considered appropriate for the study since it elicit information from Technical Education teachers and NCE II Industrial Technology Students in college of Education (Technical) on Innovative Instructional Model, Pedagogical Efficacy of Teacher, Productivity of Students and Motivation of Technical Education Students in practical activities.

Area of the Study

The study was conducted in the North-West geo-political zone of Nigeria, one of the six geo-political zones in the country. The zone consists of seven states: Kebbi, Sokoto, Zamfara, Katsina, Kano, Jigawa, and Kaduna. Within this zone, there are three Colleges of Education (Technical) that offer Industrial Technical Education. The need for qualified technical teachers in these institutions underscores the importance of adopting innovative instructional models. The North-West was chosen as the study area because many of its educational institutions are characterized by poor infrastructure, limited teacher proficiency, curriculum misalignment, and inadequate support systems. These challenges make the region particularly relevant and suitable for conducting this study.

Population of the Study

The population of the study comprised 67 students of Industrial Technical Education (Woodwork option) from three Colleges of Education (Technical) in the North-West. The distribution of students was as follows: Federal College of Education (Technical), Bichi, Kano State with 34 students; Federal College of Education (Technical) (Female), Gusau, Zamfara State with 22 students; and Federal College of Education, Gidan-Madi, Sokoto State with 11 students. Out of the 67 students, 15 were females while 52 were males.

Sample

The 3 colleges were purposively selected. However, due to the manageable size of the population, the entire population of 67 students was used for the study.

Instrument for Data Collection

A structured questionnaire was used as the instrument for data collection. The questionnaire contained 47 items and was developed in line with the research questions. It was divided into two sections: Section A and Section B.

Section A obtained personal information from the respondents and consisted of items 1–4 with blank spaces provided for respondents to complete as appropriate. Section B was divided into four clusters (A–D). Cluster A focused on the Innovative Instructional Model and covered items 1–11, which elicited information on the awareness and understanding of the Innovative Instructional Model among NCE II Industrial Technology students in Colleges of Education (Technical). Cluster B addressed the Pedagogical Efficacy of Teachers and covered items 1–12, which gathered information on the awareness of pedagogical efficacy among student-teachers in NCE II Industrial Technology programs. Cluster C examined the Productivity of Technical Education Students in Practical Activities and covered items 1–12, designed to obtain information on the productivity of NCE II students in practical activities. Cluster D dealt with the Motivation of Technical Education Students in Practical activities and covered items 1–15, which elicited information on the motivation of NCE II students in practical work. The response options attached to the questionnaire items were based on a five-point Likert scale: Strongly Agree (SA) – 5, Agree (A) – 4, Undecided (UD) – 3, Disagree (DA) – 2, and Strongly Disagree (SD) – 1.

Validation of the Instrument

The instrument was subjected to face and content validation by three Lecturers in the Department of Industrial Technical Education, University of Nigeria, Nsukka.

Reliability of the Instrument

The reliability coefficient of the instrument was determined using the Cronbach Alpha method. Copies of the structured questionnaire were administered to 10 NCE II Industrial Technology students (both male and female) at the College of Education (Technical), Gombe, Gombe State. The Statistical Package for the Social Sciences (SPSS, version 20) was employed to compute the overall reliability coefficient, which yielded a value of 0.82.

Method of Data Collection

A total of sixty-eight copies of the questionnaire were administered to respondents across different Colleges of Education (Technical) with the assistance of three research assistants who were familiar with the study area. The research assistants were given clear instructions on how

to administer the questionnaires to the respondents selected for the study. Out of the three research assistants, two were assigned to administer the questionnaires to male students, while the remaining one, together with the researcher, administered them to female students. At the end of the exercise, sixty-seven completed copies of the questionnaire were retrieved from the respondents.

Method of Data Analysis

Pearson Product Moment Correlation (PPMC) was employed to test the null hypotheses at the 0.05 level of significance.

Results

Hypothesis 1

Relationship between Innovative instructional model and pedagogical efficacy of teachers in practical activities

Table 1: Correlation between Innovative Instructional Model and pedagogical efficacy of teachers

Correlations

		Innovative Instructional Model	Pedagogical Efficacy of Teachers
Innovative Instructional Model	Pearson Correlation	1	.511**
	Sig. (2-tailed)		.000
	N	67	67
Pedagogical Efficacy of Teachers	Pearson Correlation	.511**	1
	Sig. (2-tailed)	.000	
	N	67	67

The result in Table 1 depicts the correlation between Innovative Instructional Model and pedagogical efficacy of teachers in practical activities in North west Nigeria. It can be observed that there is a positive relationship between their Innovative Instructional Model and pedagogical efficacy of teachers, the table also shows the correlation between the two variables.

It can be observed there was a moderate correlation (.511) between the Innovative Instructional Model and pedagogical efficacy of teachers in practical activities in North west Nigeria. The positive correlation also depicts the direction of the relationship, this implies that the variables move in the same direction to each other, this implies that when Innovative Instructional Model increases pedagogical efficacy of teachers also increases. Therefore, if the Innovative Instructional Model such as I believe innovative instructional models are for enhancing learning in Technical Education is increased the pedagogical efficacy of teachers also increases, but if it is reduced pedagogical efficacy of teachers also increases.

Hypothesis 2

Relationship between Innovative instructional model and productivity of Technical Education students in practical activities

Table 2: Correlation between Innovative Instructional Model and productivity of Technical Education students

Correlations

		Innovative Instructional Model	Productivity of Industrial Technology Students
Innovative Instructional Model	Pearson Correlation	1	.495**
	Sig. (2-tailed)		.000
	N	67	67
Productivity of Industrial Technology Students	Pearson Correlation	.495**	1
	Sig. (2-tailed)	.000	
	N	67	67

The result in Table 2 shows the correlation between Innovative Instructional Model and productivity of Technical Education students in practical activities in North West Nigeria. It can be observed that there is a positive relationship between their Innovative Instructional Model and productivity of Technical Education students in practical activities in Northwest Nigeria. It can be observed there was a positive correlation between the Innovative Instructional Model and productivity of Technical Education students in practical activities; the table also revealed that there was a moderate correlation (.495) between the Innovative Instructional Model and

productivity of Technical Education students. This implies that the correlation between Innovative Instructional Model and productivity of Technical Education students in practical activities is moderate. The positive correlation also depicts the direction of the relationship, this implies that the variables move in the same direction to each other, this indicates that when Innovative Instructional Model increases their productivity of Technical Education students also increases, but if it is reduced productivity of Technical Education students also decreases.

Hypothesis 3

Relationship between Innovative instructional model and motivation of Technical Education students in practical activities

Table 3: Correlation between Innovative Instructional Model and motivation of Technical Education students

Correlations

		Innovative Instructional Model	Motivation of Industrial Technology Students
Innovative Instructional Model	Pearson Correlation	1	.388**
	Sig. (2-tailed)		.001
	N	67	67
Motivation of Industrial Technology Students	Pearson Correlation	.388**	1
	Sig. (2-tailed)	.001	
	N	67	67

The result in Table 3 shows the relationship between Innovative instructional model and motivation of Technical Education students. It can be observed that there is a positive relationship between Innovative instructional model and motivation of Technical Education students, while the value (.388) shows that the correlation between Innovative instructional model and motivation of Technical Education students is weak. The positive relationship also suggests the direction of the relationship, this implies that the variables move in the same direction to each other, this shows that when Innovative instructional model in practical activities increases the motivation of Technical Education students

Summary of Findings

The following findings emerged from the study based on the hypotheses tested:

1. A moderate and positive correlation exists between Innovative instructional model and Pedagogical efficacy of teachers in practical activities in Northwest Nigeria.
2. A moderate and positive correlation exists between Innovative instructional model and productivity of Technical Education students in practical activities in Northwest Nigeria.
3. A weak and positive correlation exists between Innovative instructional model and motivation of Technical Education students in practical activities in Northwest Nigeria.
4. Significant relationship exists between Innovative instructional model and Pedagogical efficacy of teachers in practical activities.
5. Significant relationship exists between Innovative instructional model and productivity of Technical Education students in practical activities.
6. Significant relationship exists between Innovative instructional model and motivation of Technical Education students in practical activities.

Discussions

The findings of the study revealed, that a positive correlation exists between Innovative instructional model and Pedagogical efficacy of teachers in practical activities in Northwest Nigeria and this finding agreed with the finding of Nwani, K. (2021) that study examines the perception of teacher effectiveness and its role in optimizing students' learning in five private primary schools in Lagos State. The findings from this study revealed teachers' practices and personal qualities that are integral for effective teaching and students' learning optimization. The findings also agreed with Achufusi & Utaka (2021) that motivation was a significant factor on students' academic achievement in physics. It was found out that a moderate positive correlation exists between Innovative instructional model, Pedagogical efficacy of teachers, productivity and motivation of Technical Education students in Northwest,Nigeria. The findings of the study agreed with the findings of Orji & Ogbuanya (2022) that relationship exist between Problem Based Learning and associated positively with engagement in practical skills acquisition EPSA.

Conclusion

Innovative Instructional Model significantly influences the productivity and motivation of Technical Education students in practical activities. Effective implementation of innovative teaching methods enhances student engagement, learning outcomes, and overall performance in practical tasks. Also, pedagogical efficacy of teachers plays a crucial role in shaping student productivity and motivation in Technical Education. Teachers' ability to effectively deliver

content, provide guidance, and create a conducive learning environment positively impacts student engagement and achievement, as there is a strong correlation between the innovative instructional model, pedagogical efficacy of teachers, student productivity, and motivation. By focusing on enhancing student productivity and motivation through practical activities, institutions can better prepare Technical Education students for real-world challenges and opportunities.

Recommendations

Based on the findings made and the conclusion drawn, the following recommendations were made:

1. Encouraging the adoption of innovative instructional models and providing professional development opportunities for teachers to enhance their pedagogical skills can lead to improved student outcomes.
2. Emphasizing the importance of creating an engaging and supportive learning environment that fosters student motivation and productivity is essential for enhancing the overall educational experience.
3. Colleges of education in North West Nigeria should prioritize the integration of innovative teaching approaches and support teachers in developing effective pedagogical strategies.

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