

Exploring the Nexus: Professional Competencies and Effective Teaching of Agricultural Science in Bayelsa State Secondary Schools, Nigeria.

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Abstract: This study examined the correlation between professional competencies and effective teaching agricultural science in Bayelsa State secondary schools, Nigeria. The study adopted descriptive survey research design. The target population consist of 190 teachers of agricultural science in secondary schools in Bayelsa State, Nigeria. The target population of 190 respondents was also the sample. Exploring the Nexus: Professional competencies and the effective of teaching agricultural science in secondary schools Questionnaire (ENPCETASQ) was developed by the researchers for data collection. The instrument was face-validated by three experts (Agricultural educationist, and two test Evaluator) Niger Delta University (NDU), Nigeria. Cronbach alpha reliability method was used to determine the consistency of the questionnaire items and an overall reliability coefficient of 0.88 was obtained and was judged to be good enough for this study. Two research questions and a corresponding null were raised for the study. Data collected were analyzed using mean and standard deviation to answer the research questions while Person Product Moment Correlation (PPMC) was used to test the two null hypotheses for the study at 0.05 level of significance. It was found out from the study that there very strong positive correlation between professional competencies and effective teaching of agricultural science in Bayelsa State secondary school, Nigeria s. The findings may inform educational policies, teacher training programs, and curriculum development to improve the overall quality of agricultural science instruction in secondary schools. It was recommended that Adequate funding for textbooks, laboratory equipment, and technology infrastructure is crucial for creating a conducive learning environment. Policymakers are urged to recognize the implications of the strong positive relationship between digital competencies and effective teaching in crafting educational policies.

Keywords: Professional Competencies, pedagogical competencies, digital competencies and effective teaching

INTRODUCTION

Education is a lifelong process that promotes human development, empowerment, as well as the acquisition of information and skills necessary for managing life's challenges. Agricultural science not only equips students with essential knowledge but also fosters skills that are instrumental for sustainable development. Agricultural science according to Tibi in Onipede, Lawal, and Samuel (2020), is a subject designed to increase students' cognitive and physical talents in the field of agriculture, thereby enhancing their knowledge, skills, and outlook on self-improvement and national development. Agriculture science educates individuals in the production of crops and farm animals. It entails teaching students how to better manage agricultural activities in the production, processing, packaging, and marketing areas so as to secure employment in the public or private sector or become independent.

According to the National Policy on Education, (Federal Republic of Nigeria, 2013) the objectives of agricultural science in secondary schools which include stimulating and maintaining students' interest in agriculture, facilitating the acquisition of fundamental information and practical skills in

agriculture, and fostering students' independence. Agricultural Science education in secondary schools is a critical component of the state's educational system, designed to equip students with knowledge and skills related to agriculture and agribusiness. The curriculum for agricultural science in Bayelsa State secondary schools emphasizes a multidisciplinary approach, covering topics such as crop production, animal husbandry, soil science, agricultural economics, and agribusiness. The integration of agricultural science into the secondary school curriculum is aimed at fostering an understanding of agricultural principles, sustainable farming practices, and the role of agriculture in the state's economic development. Teachers play a crucial role in shaping the educational experiences of their students.

The agricultural science teacher is responsible for educating students about agriculture-related knowledge, abilities, and attitudes. The teacher of agricultural science according to Ndem (2016), is someone who has obtained professional training in agriculture and who has acquired the knowledge, skills, attitudes, technical know-how, and teaching methodologies required to impart agricultural science to learners. In order to teach agricultural science successfully

towards achieving the pragmatic objectives of the subject matter, teachers need improvement in their job. Professional competencies refers to the information, skills, abilities, and character traits that people possess and exhibit in a professional context. Professional competence involves more than just knowledge, skills, attitudes, and motivational variables but also contribute to the mastery of teaching and learning (Akinbode and Abati, 2019).

The importance of professional competencies in teaching lies in its direct impact on student learning, effective classroom management, adaptability, continuous development, teacher effectiveness, and positive contributions to the broader educational community. Professional capabilities are classified into two types: academic and pedagogical. Academic competence refers to a teacher's knowledge of a subject. Other competencies of competent teachers include subject matter knowledge, pedagogy, ability processes, resourcefulness, behaviour motivation, and assessment (Kenny, Berenson, Chick, Johnson, Keegan, Read & Reid, 2017). This study would focused at digital and pedagogical competencies as some of the key professional competencies that can contribute to effective teaching of agricultural science.

Pedagogical competence according to (Murkatik, Harapan and Wardiah, 2020), refers to how a teacher can teach a subject while adhering to ideas like teaching from the known to the unknown, concrete to abstract, and simple to complex. Teacher pedagogical competencies are characterized by teaching techniques, instructional resource utilization, and learner assessment (Costa, Cardoso, Lima, Ferreira & Abrantes, 2015). Voss, Kunter, and Baumert (2011) and König, Blömeke, Paine, Schmidt, & Hsieh. (2011), added that the main components of the pedagogic competence are: knowledge of classroom management; knowledge of teaching methods; knowledge of classroom assessment; structure of learning objectives and the lesson process, lesson planning and evaluation; and, adaptability dealing with heterogeneous learning groups in the classroom.

Teachers in the twenty-first century need digital pedagogical skills to compete in the new digital world (Casillas Martn, Cabezas González, & Garca Pealvo, 2019). These skills will help both the teacher and their students grow. As technology changes, teaching professionals face two challenges in the classroom: first, they need to learn how to use digital tools, and second, they need to make sure that all of their students have the skills they need to learn. The very rapid development of digital technology in the era of the industrial brought a wave of change where some future jobs require digital skills (Williamson, 2019). This includes the teaching profession who plays an important role in the learning process. Teachers carry out their roles not only as content or knowledge transmitters and being the only source in learning, but are required to be able to integrate digital technology into the

learning process properly and wisely to facilitate students' learning and develop the potential that exists within students.

Digital competence according to Ferrari (2012), refers to knowledge, skills and attitudes needed to be functional in a digital environment and the appropriation of digital technology in specific environment. Teachers employ a set of digital competencies that they might apply to future classroom practices by employing interactive materials deemed appropriate for educational settings (Fulgence, 2020). Digital competence involves the confident, critical and responsible use of, and engagement with, digital technologies for learning, at work, and for participation in society. It includes information and data literacy, communication and collaboration, media literacy, digital content creation (including programming), safety (including digital well-being and competences related to cybersecurity), intellectual property related questions, problem solving and critical thinking. (European Union, 2018).

Clearly, teachers are expected to adequately use digital technologies to strengthen their teaching practice and enhance their educational practice. The problem is that it is not always clear which digital competencies Digital competence has been understood in relation to digital literacy, digital capabilities, digital knowledge, etc. Digital competence is a critical element in a teacher's successful integration of digital technologies in learning (Tondeur, Aesaert, Prestridge, & Consuegra, 2018). It is of particular importance when considering how teachers move to designing online, blended or hybrid learning spaces. Throughout the years, different terms have been used to capture 'digital competence', namely it has overlapped with 'digital literacy' in terms of higher order capabilities, such as problem solving with digital technologies. However, competencies have typically combined digital skills with digital literacies. Every day, new platforms appear thus, educators must be familiar with how to use all digital resources in their lessons.

The dynamic nature of the agricultural industry demands that educators stay abreast of evolving technologies, methodologies, and best practices. This deficiency in professional competencies could hinder the overall quality of education and limit students' preparedness for the challenges and opportunities within the agricultural sector. Therefore, an investigation into the correlation between professional competencies and the effectiveness of teaching agricultural science in secondary schools within Bayelsa State is crucial for designing targeted interventions and professional development programs that enhance their effectiveness in preparing students for successful engagement in the agricultural field.

PURPOSE OF THE STUDY

The major purpose for conducting this research is to investigate the correlation between professional competencies and the effective of teaching agricultural science in secondary

schools within Bayelsa State, Nigeria. Specifically, the study sought to:

- i. ascertain the pedagogical competencies needs for effective teaching of agricultural science in Bayelsa State secondary schools, Nigeria.
- ii. Find out the digital competencies needs for effective teaching of agricultural science in Bayelsa State secondary schools, Nigeria.

The following research questions guided the study:

- i. What is the pedagogical competencies needs for effective teaching of agricultural science in Bayelsa State secondary schools, Nigeria?
- ii. What is the digital competencies needs for effective teaching of agricultural science in Bayelsa State secondary schools, Nigeria?

HYPOTHESES

The underneath formulated null hypotheses were tested at 0.05 level. alpha

- i. There is no significant correlation between pedagogical competencies and teacher’s effective teaching of agricultural science in Bayelsa State secondary schools, Nigeria.
- ii. There is no significant correlation between digital competencies and teacher’s effective teaching of agricultural science in Bayelsa State secondary schools, Nigeria.

METHODOLOGY

The study adopted descriptive survey research design. The target population consist of Agricultural science teachers in secondary schools in Bayelsa State, Nigeria. The target

population consist of 190 teachers of agricultural science was also the sample. The instrument used for the study was a self-designed questionnaire titled “Exploring the Nexus: Professional Competencies and Effective Teaching of Agricultural Science “(ENPCETASQ) was developed by the researchers for data collection. The instrument was designed after the modified Likert scale with five (5) point response format, thus: 5 = Very Highly Needed (VHN), 4 = Highly Needed = (HN), 3 = Moderately Needed (MN), 2 = Partially Needed (PN) and 1= Not Needed (NN). The data collecting instrument was face-validated by three experts (Agricultural educationist, and two test -Evaluators) from Niger Delta University (NDU), Nigeria. Corrections and additions from these experts were included in the final draft of the ENPCETASQ. Cronbach alpha reliability method was used to determine the consistency of the questionnaire items and an overall reliability coefficient of 0.88 was obtained and was judged to be good enough for this study. A total of one hundred and ninety (190) copies of questionnaire were administered to the teachers of agricultural science in Bayelsa State secondary schools, and one hundred and seventy- three (173) copies (91%) were retrieved and analysed. Data collected were analyzed using mean and standard deviation to answer the research questions.. Person Product Moment Correlation (PPMC) was used to test the two null hypotheses for the study at 0.05 level of significance. The decision criteria was 0.05 Alpha level. Any null hypothesis whose p-value is less than 0.05 will be rejected but otherwise accepted. The research questions was answered using the real limit of the mean values as follows: VHN = 4.50 - 5.00, HN = 3.50 – 4.49, MN = 2.50 – 3.49, PN = 1.50 – 2.49 and NN = 0.50 – 1.49. The analysis were conducted using the statistical package for social sciences (SPSS) version 25 programme.

RESULTS OF THE FINDINGS

Research Question One

What is the pedagogical competencies needs for effective teaching of agricultural science in Bayelsa State secondary schools, Nigeria?

Table 1: Mean and standard deviation scores of respondents on pedagogical competencies needs of teachers of agricultural science for enhancing effective teaching in Bayelsa State secondary schools, Nigeria.

S/N	Item Statement	Teachers of Agric. Sci. (n = 173)		Decision
		\bar{X}_1	SD ₁	
1	A deep understanding of agricultural science concepts, practices, and principles.	4.34	1.07	HN
2	Ability to design and develop curriculum materials that align with the local educational standards and goals.	4.22	1.09	HN
3	Incorporate practical activities to make the subject more engaging.	4.33	1.07	HN
4	Ability to manage time, resources, and student behavior to optimize the learning experience.	4.28	1.17	HN
5	Adapt teaching methods to cater to diverse learning styles and abilities.	4.26	1.15	HN

6	Being able to develop fair and effective assessment strategies that evaluate both knowledge and practical skills.	4.37	1.03	HN
7	Clearly communicate complex agricultural concepts in a way that is accessible to students.	4.28	1.06	HN
8	Encourage critical thinking and problem-solving skills through practical activities and real-world scenarios	4.22	1.13	HN
9	Stay current with educational research and advancements in agricultural science.	4.33	1.00	HN
10	Organize field trips or guest lectures to provide real-world exposure.	4.33	1.00	HN
Grand Mean and Standard Deviation		4.30	1.08	

Key: $X = \text{Mean}$, $SD = \text{Standard Deviation}$, Highly Needed (HN) = 3.50 – 4.49

The data displayed in Table 1 show that the mean values for all ten items range from 4.22 to 4.37. These values are within the real limit of 3.50 - 4.49, the standard deviation values for the ten items range from 1.00 to 1.17. The overall grand mean score is 4.30, falling within the real limit of 3.50 - 4.49; this indicates that the respondents generally agree that the specified pedagogical competencies are necessary for effective teaching by teachers of agricultural science in

Bayelsa State secondary schools, Nigeria. The overall standard deviation of 1.08 suggests that the respondents have similar opinions.

Research Question Two

What are the digital competencies needs of teachers of agricultural science for enhancing effective teaching in Bayelsa State secondary schools, Nigeria?

Table 2: Mean and standard deviation scores of respondents on digital competencies needs of teachers of agricultural science for enhancing effective teaching in Bayelsa State secondary schools, Nigeria.

S/N	Item Statement	Teachers of Agric. Sci.		Decision
		\bar{X}_1	SD_1	
		(n = 173)		
11	Teachers should be adept at finding and using digital resources related to Agricultural Science. This includes e-books, online articles, videos, and simulations.	4.15	0.89	HN
12	Familiarity with software and applications relevant to Agricultural Science, such as agricultural simulation tools, farm management software, and educational apps for agriculture.	4.19	0.95	HN
13	Ability to navigate and utilize online databases and repositories that provide access to relevant agricultural research, case studies, and data	4.23	0.98	HN
14	Proficiency in using Learning Management Systems for organizing course materials, assignments, and communication with students.	4.18	0.88	HN
15	Familiarity with virtual classroom platforms for conducting online classes, hosting discussions, and facilitating collaborative projects.	4.15	0.95	HN
16	Skill in creating and delivering digital presentations using tools like Microsoft PowerPoint, Google Slides, or other interactive presentation tools.	4.13	1.05	HN
17	Ability to incorporate audio-visual materials, such as educational videos, animations, and interactive multimedia elements, into lessons.	4.15	0.98	HN
18	Proficiency in using email, messaging apps, and other communication tools to stay in touch with students, parents, and colleagues.	4.21	0.99	HN
19	Ability to use collaborative tools for group projects and activities, fostering teamwork among students.	4.21	0.99	HN
20	Understanding and promoting digital citizenship, including online safety, responsible internet use, and ethical behavior in digital environments.	4.09	0.89	HN

Grand Mean and Standard Deviation **4.17** **0.96**

Key: $X = \text{Mean}$, $SD = \text{Standard Deviation}$, Highly Needed (HN) = 3.50 – 4.49

Data presented in Table 2 depicts that the mean value of all the ten items ranges from 4.09 to 4.23 were all within the real limit of 3.50 - 4.49, while the standard deviation value of the ten items ranging from 0.88 to 1.05. On the whole, the grand mean score of 4.17 were all within the real limit of 3.50 - 4.49. This indicates that respondents generally agree that the specified digital competencies are necessary for enhancing effective teaching by teachers of agricultural science in Bayelsa State secondary schools, Nigeria. The overall standard deviation of 0.98 suggests that the respondents have similar opinions. The consistency in responses, as indicated

by the relatively low standard deviation values, strengthens the confidence in this conclusion.

TESTING OF HYPOTHESES

Hypothesis One

There is no significant correlation between pedagogical competencies and teacher’s effective teaching of agricultural science in Bayelsa State secondary schools, Nigeria.

Table 3: Person Product Moment Correlation (PPMC) Analysis of Correlation between Pedagogical competencies and Effective Teaching

		Pedagogical Competencies	Effective Teaching
Pedagogical Competencies	Pearson Correlation	1	.986**
	Sig. (2-tailed)		.001
	N	173	173
Effective Teaching	Pearson Correlation	.986**	1
	Sig. (2-tailed)	.001	
	N	173	173

The result presented in Table 3 revealed a correlation coefficient (r) of .986 which is positive and very strong. This suggests that there is a very strong positive relationship between pedagogical competencies and teacher’s effective teaching of agricultural science in Bayelsa State secondary schools, Nigeria. The p-value (0.001) which is less than 0.05 level of significance indicates a significant correlation. Hence the null hypothesis which state that there is no significant correlation between pedagogical competencies and effective teaching of agricultural science is rejected on the ground that

there is a significant correlation between pedagogical competencies and teacher’s effective teaching of agricultural science in Bayelsa State secondary schools, Nigeria.

Hypothesis Two

There is no significant correlation between digital competencies and teacher’s effective teaching of agricultural science in Bayelsa State secondary schools, Nigeria.

Table 4: Person Product Moment Correlation (PPMC) Analysis of Correlation between Digital competencies and Effective Teaching

		Digital Competencies	Effective Teaching
Digital Competencies	Pearson Correlation	1	.991**
	Sig. (2-tailed)		.007
	N	173	173
Effective Teaching	Pearson Correlation	.991**	1
	Sig. (2-tailed)	.007	
	N	173	173

Source: SPSS Version 25 Window Output

The result presented in Table 4 shows a correlation coefficient (r) of .991, which is positive and very strong. This suggests that there is a very strong positive relationship between digital competencies and effective teaching of agricultural science in Bayelsa State secondary schools, Nigeria. The p-value (0.007) which is less than 0.05 level of significance indicates a significant correlation. Hence the null hypothesis which state

that there is no significant correlation between pedagogical competencies and effective teaching of agricultural science cannot be accepted. In other words, the null hypothesis is rejected because there is enough evidence that there is a significant correlation between pedagogical competencies and teacher’s effective teaching of agricultural science in Bayelsa State secondary schools, Nigeria.

DISCUSSION OF THE FINDINGS

The findings presented in Table 1 shows that the mean values for all ten items, ranging from 4.22 to 4.37. These values are within the real limit of 3.50 - 4.49. The overall grand mean score, calculated at 4.30, were also within the real limit of 3.50 - 4.49. This signifies a collective agreement among respondents that the listed pedagogical competencies in Table 1 are necessary for effective teaching in the context of agricultural science in Bayelsa State secondary schools, Nigeria.

Furthermore it was also observed from Table 3 that the p-value (0.001) which is less than 0.05 level of significance indicates a significant correlation. Hence the null hypothesis which state that there is no significant correlation between pedagogical competencies and effective teaching of agricultural science was rejected on the ground that there is a significant correlation between pedagogical competencies and teacher's effective teaching of agricultural science in Bayelsa State secondary schools. Investing in training programs that enhance teaching methodologies, instructional strategies, and classroom management skills can empower teachers to deliver agricultural science education more effectively.

The findings of this study is in agreement with the works of Wali and Zafarullah (2022), who carry out a study on pedagogical competencies of teachers and the achievement of students: explorations of best practices through a literature review and found out that there is a direct relationship between a teacher's competence and a student's academic achievement. Wali and Zafarullah (2022) noted that if the teacher's competence is developed, the students' academic achievement will improve.

The findings presented in Table 2 indicate that mean values for all ten items, ranging from 4.09 to 4.23 were all within the real limit of 3.50 - 4.49. The overall grand mean score, calculated at 4.17, and it falls within the real limit of 3.50 - 4.49. This implies that, the respondents agree that the listed digital competencies in Table2 are necessary for effective teaching of agricultural science in Bayelsa State secondary schools, Nigeria.

Furthermore it was also observed from Table 4 that the p-value (0.007) which is less than 0.05 level of significance indicates a significant correlation. Hence the null hypothesis which state that there is no significant correlation between digital competencies and effective teaching of agricultural science was rejected on the ground that there is a significant correlation between digital competencies and teacher's effective teaching of agricultural science in Bayelsa State secondary schools, Nigeria. As the digital landscape continues to evolve, integrating digital competencies into teaching practices becomes increasingly relevant to prepare

students for a technologically driven future and to address the specific needs of the region's agrarian economy.

The findings of this study is in agreement with the works of Vilchez Guizado and Ramón Ortiz (2022). They analyzed and evaluated the level of development of digital competencies of Secondary school teachers in the management of virtual mathematics teaching. They considered three categories of analysis: acceptance of digital technology, digital information management, and the generation of digital content, which had a positive and moderate correlation.

CONCLUSION

The discovery of a very strong positive correlation between professional competencies and effective teaching of agricultural science in Bayelsa State secondary schools, underscores the pivotal role educator's play in shaping the future of agricultural education. This discussion advocates for a holistic approach, emphasizing the continuous development of professional competencies among educators and the formulation of policies that foster a conducive environment for effective teaching. Through such concerted efforts, Bayelsa State can cultivate a vibrant and impactful agricultural science education system that equips students with the knowledge and skills necessary for success in the agricultural sector and beyond.

RECOMMENDATIONS

1. Adequate funding for textbooks, laboratory equipment, and technology infrastructure is crucial for creating a conducive learning environment.
2. Policymakers are urged to recognize the implications of the strong positive relationship between digital competencies and effective teaching in crafting educational policies.
3. The teaching service commission of Bayelsa State should organize capacity building workshop on effective lesson delivery to retaining teachers of agricultural science to enable them improve their level of lesson delivery in secondary schools.
4. School administrators should invest in agriculture by establishing school farms where teachers will put their practical knowledge to use while students learn skills and attitudes in agriculture for future use.

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