

NASCENT TECHNOLOGIES AND TEACHING EFFECTIVENESS: EVIDENCE FROM BUSINESS EDUCATORS' IN PUBLIC UNIVERSITIES

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Abstract

The study examined the influence of nascent technologies on business educators teaching effectiveness in public universities in South-South, Nigeria. Two research questions were posed and two hypotheses were formed and tested at a 0.05 level of significance. A descriptive correlational research design was used to achieve the purpose of the study. Census or total population approach was used to select 226 business educators in public universities in South-South, Nigeria who participated in the study. A structured questionnaire was the instrument for data collection. The instrument was validated by three experts, two in Business Educators and one in Measurement and Evaluation. Cronbach's alpha was used to determine the reliability, which yielded a good reliability coefficient indexes. Data was collected and analyzed using simple linear regression statistical tool. The findings reveal that artificial intelligence (AI) and Internet of Things (IoT) significantly influenced the teaching effectiveness of business educators in public universities in South-South Nigeria. The authors recommended that Business educators should endeavor to leverage more on the use of AI and internet computing in teaching for effectiveness and clarity on some subject matters in relation to the overall growth of the students in the foreseeable future.

Keywords: AI, Artificial Intelligence, Business Education, Business Educators, IoT, Internet of Things, Public Universities, Teaching Effectiveness.

Introduction

Over the years, nascent technologies have grown exceedingly in terms of their usage. These new technologies have forced growth and development exceedingly in many countries, schools and societies, thus significantly facilitating the change of operations, approaches and practices in all facets of life. Put in the perspective of business education, the application of these technologies helps in solving problems regarding impartation of skills to learners to meet changing needs and demand of the society. In business education, there exist technology in a crude form but there has been a dramatic and significant change in the methods used by business education to address the changing needs of the society (Igbongidi, 2022). The widespread use of technology has great impact on the way employees work, play, learn and communicate, even the way we carry out away our regular day-to-day activities. In higher education, technology has induced a striking impact on teaching and learning (Mamman, 2019). Tertiary institutions are well-positioned to take advantage of rapid changes in the field of education and business education in particular. Most importantly, among these technologies, nascent technologies are at the forefront now and have grabbed the attention of educators' (Raja &

Nagasubramani 2018).

Nascent technologies are those devices, gadgets, applications that makes job easier, increase proficiency, save time, seamless and helps in execution of task. Nascent technology revolves round the use of internet and other technological resources such as artificial intelligence, virtual reality, Blockchain technology, ubiquitous computing, internet of things and teleconferencing which are aimed at improving productivity and the application of these in teaching and learning helps to improve the delivery process and in turn assists to better students' performance in the education system for self-reliance (Ogungbo *et al.* 2024).

Nascent instructional technologies can help facilitate teaching profession in the e-world (Enang & Okute 2019). Business educators are pedagogical leaders that play a pivotal role in facilitating the integration of new technologies into the classroom. Skillful business educators are a necessary for the implementation of a challenging curriculum that stimulates higher order learning and the development of 21st century skills that are needed in the e-world. Students of business education prefers the use of these nascent technologies and tools in learning which leads to an increase in student learning and interaction. These technologies when used by business educator in teaching shapes, enlighten and motivates students to prepare them to be entrepreneurs, career in high business offices and in the world of web, this is in line with Ajuluchukwu and Osakwe (2019) which explains that individuals who graduate from business education are meant to be creative and be able to implement new ideas and ways of doing things. Graduates from business education programmes are expected to be job creators and not job seekers.

Artificial intelligence (AI) has potential to improve the involvement of learners in schooling; it is one of the most recent and potentially most globally impacting breakthroughs that is changing the global environment (Undie *et al.*, 2025). Also, in business education this technology is transforming teaching methodologies and enhancing learning outcomes. AI as a new technology is the ability of machines to adapt to new situations, deal with emerging situations, solve problems, answer questions, device plans, and perform various other functions that require some level of intelligence typically evident in human beings (Chen *et al.*, 2020). In envisioning future jobs and human resources specialists' requirements, teachers must equip students with a proficiency that makes them adaptable to challenges. Teachers significantly contribute to society by educating generations of upcoming students that would become future entrepreneurs (Surugiu *et al.*, 2024). The teacher exerts a triple role, being a content expert and creator, a knowledge spreader, and an ethical-spiritual guide with wisdom (Tan, 2020).

The Internet of Things (IoT) is a profound technological tool, blurring the lines between the physical and digital worlds. It promises to make our lives more convenient, our education more efficient, and our world more responsive. The IoT is a collection of devices or objects that are linked together using an Internet connection (Kumar *et al.*, 2019). The hub for the collection (the "things" part) is what sends and collects data using the Internet, which helps the devices to make decisions and remember particular patterns and routines for action to be carried out without any manual involvement. The IoT simply means the connection of multiple devices to the internet. The IoT is a global infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on existing and evolving interoperable information and communication technologies. The goal of the IoT is to enable things to be connected anytime, anyplace, with anything and anyone ideally using any path/network and any services. The IoT refers to a type of network to connect anything with the Internet based on stipulated protocols through information, sensing equipment's to conduct information exchange and communications in order to achieve smart recognitions, positioning, tracing, monitoring, and administration.

Business educators are pedagogical leaders that play a pivotal role in facilitating the integration of new technologies into the classroom. Skillful business education teachers are a prerequisite for the

implementation of a challenging curriculum that stimulates higher order learning and the development of 21st century skills that are needed in the e-world. In line with the objectives of introducing Business Education at public institutions, the business educator ensures that the programme produces competent degree graduates: Who can be self-employed; teach Business Education courses in secondary schools and higher institutions; conversant with the usage of technologies in teaching, inculcate business ideas into the economy; that can help in formulating economic policies and graduates that can employ other persons to reduce unemployment.

Business educators require adequate training to be able to create and use appropriate resources and instructional materials for effective teaching and learning processes. The need for business educators to possess up-to-date knowledge as regards instructional materials use is particularly important in business education programme as its learners are goal-oriented and need immediate results in their learning outcome which can be enhanced through the use of instructional materials and business educators' need to be well grounded in the skills of improvising and selecting appropriate materials, which will make their duty as facilitators more meaningful, enjoyable, easy and appropriate or effective (Agbonaye & Akele, 2018). Business educators' also need to possess adequate knowledge and skills in instructional development. A proficient business educator must stay updated on societal advancements in order to recognize the society's requirements. This awareness empowers him to tailor his instruction to meet contemporary world requirements. The business educators should possess a high level of expertise and be considered a final product, rather than being seen as an intermediary stage in the hands of others. The educator should possess the ability to reinvest their own human capital, which refers to their knowledge, skills, abilities, competencies and expertise. The required training should empower him to not only seek employment but also become an entrepreneur, capable of generating employment opportunities (Olowe & Enijuni, 2024).

Teaching effectiveness is an important aspect of human development as it concerns learning outcomes. It is the process through which teachers demonstrate professionalism in the course of lesson delivery. It begins with understanding of the course content which includes application of the best teaching practice, pedagogy and adoption of appropriate methodology. Effective teaching is one that produce demonstrable results in terms of the cognitive and affective development of the students and hence it is an important component in the teaching profession (Mupal & Chinooneka, 2015). Effective teaching involves far more than presenting content and methods used to convey contents. It involves ensuring that learners are carried along in order to achieve the desired learning outcome as designed in the curriculum.

Effective teaching further involves far more than presenting content and methods used to convey contents. It also involves ensuring that learners are carried along in order to achieve the desired learning outcome as designed in the curriculum. Business education is that aspect of total education that inculcate in the recipients the pedagogical knowledge, skills, abilities, attitudes and characteristics that will prepare them as business operators and at the same time be readily equipped with the competencies required for employment (Okute *et al.*, 2019). Sequel to this, as a programme that aims at inculcating suitable educational skill and competences in the students, for better performance in different private and public fields of endeavour, there is the direct need for teachers to move away from dedicated teaching where students are essentially passive, to set up learning experiences, be active and have some control over the course of the learning taking place.

In public Universities, business educators are essential assets for achieving viable business education programme through instructional process. The quality of business education programme depends so much on the quality of the programme offering as well as the quality of the teachers available for achieving the programme objectives (Adeyemi, 2022). It is the business educators' that are responsible for business education instruction or teaching where quality of business educators' is involved in the business of classroom instruction, there is no doubt that the quality of instruction would motivate students learning.

These relatively new technologies have new pedagogical delivery systems with the ability to use responsive, quick access, and inclusive instructional climate (Undie, 2023). The world is changing in many aspects driven by many forces such as technology, new market dynamics, and the culture of new generations. The technology, primarily the platforms that use Internet is one of the main sources of this change. From tablets to the smart phones & wristwatches, smart board are the things which are considered as impossible yesterday or a part of science fiction movies, that are not only possible but have become ordinary today. In their groundbreaking book *The Innovative University*, Clayton Christensen and Henry Eyring claim that online learning as a classic innovation is changing traditional tertiary institutions (Wood, 2023). While the reliance on printed materials for teaching students has remained consistent over time, the emergence of nascent technology in education has gained significant recognition in recent years. This shift is attributed to the growing emphasis on 21st century learning, leading to the rapid integration of these technologies as a fundamental aspect of school representation (Dange, 2024). However, in spite of all these praises on nascent technologies and the way its influences business educators has been determined, thus these technologies are not here to replace the jobs of business educators but rather, amplify the usage of the technologies. They free us educators from administrative, repetitive, and logistical stress, so energy can be poured into the mentorship, wisdom, and inspiration that only a human teacher can provide. The classroom of the future is not a room at all. It is everywhere. And the most effective business educator will not be the one with the most gadgets, but the one who uses these tools with intention, using them not for their own sake, but to build better thinkers, wiser leaders, and entrepreneurs.

Statement of the Problem

Despite the popularity and the exceeding growth of nascent technologies in this digital age, it is imperative that the usage of these technologies saves time, enhance viability, bridge distance and brings about new learning experiences and advances learning outcome. Since Business educators' are the main point of the subjects' implementation in the field of business education programme, without them teaching effectively, students may be unproductive, lack relevant skills to be self-reliant, they sit in the back of the lecture hall, phone or laptop opened not to take notes, but to scroll social media, respond to chats, or shop online. They are physically present but mentally absent. Over time, this breeds disconnection, they stop seeing education as relevant. They attend to get the grade, not to grow, the fire of curiosity is slowly extinguished, replaced by a transactional mindset or likely switch to other areas of discipline.

It has been observed by the researcher that some business educators' in the study area are still obsolete, preparing their lectures notes in traditional way, in this 21st century not making use of these nascent technologies to make learning involving, interacting, simulating and even create active participation from the student before meeting them. Some business educators' during the course of teaching practical topics like computer application or keyboarding, do not make use of technologies like ubiquitous computing, internet of things amongst others during instructional delivery to enable students appreciate the lesson more. Student who are exposed to universities programme of business education are expected to be trained both in theory and practice and should be ready for necessary industrial man power, establishment of their own public and private business. For business education to remain relevant and produce graduates who are competitive in this dynamic landscape, business educators in public universities in South-South Nigeria must effectively integrate these technologies into their pedagogical practices. Their teaching effectiveness is no longer measured solely by the transmission of traditional business principles but by their capacity to equip students with the digital competencies required for modern workplaces. Despite the recognized potential of these technologies, there is not enough empirical evidence on their collective influence on the pedagogical effectiveness of business educators in this specific context. This study, therefore, seeks to fill this gap by investigating the influence of nascent technologies such as AI and IoT on business educators' teaching effectiveness

in public universities in South-South, Nigeria.

Purpose of the Study

The central purpose of the study was to examine the level to which nascent technologies influence business educators' teaching effectiveness in public Universities in South-South, Nigeria. Specifically, the study sought to examine:

1. the influence of AI on business educators' teaching effectiveness in public universities.
2. the influence of IoT on business educators' teaching effectiveness in public universities.

Research Questions

The following research questions guided the study:

Research Question 1: What is the influence of AI on business educators' teaching effectiveness in public universities?

Research Question 2: What is the influence of IoT on business educators' teaching effectiveness in public universities?

Research Hypotheses

The following null hypotheses were formed and tested at a 0.05 level of significance.

Research Hypothesis 1: AI does not significantly influence business educators' teaching effectiveness in public universities.

Research Hypothesis 2: IoT does not significantly influence business educators' teaching effectiveness in public universities.

Methods

Research Design

The research design adopted for this study was a descriptive survey design. A descriptive survey design was considered appropriate for this present study because it is a non-experimental quantitative research design that describes how one variable predict another variable based on the value of more than one or two other variables. The key goal is description not just establishing a relationship and not to manipulate the educators' but to understand the natural interplay between several predictor variables and outcome of technology integration.

Population and Sample

The population of this study comprised all Business Educators' in public universities in South-South, Nigeria. There are a total of 226 business educators' which cut across these public universities in South-South, Nigeria. The sampling technique adopted for this study was census or total population approach, which was used to incorporate all the business educators into the study since the number is of a manageable size.

Instrument: Validation and Reliability

A 47-item structured questionnaire, titled Nascent Technologies and Teaching Effectiveness Questionnaire (NTTEQ) was used for data collection. The instrument was validated by three experts, two from Business Education and one from Measurement and Evaluation. The NTTEQ had response options, ranging from Strongly Agree (SA) to Strongly Disagree (SD). The NTTEQ was tested for reliability, using Cronbach's alpha, which yielded the reliability coefficient values of 0.72 for the independent variable and 0.85 for the dependent variable respectively.

Data Collection and Analysis

Data collected after administration of the questionnaire were studied and analyzed using simple

linear regression. Simple linear regression was used to answer the research questions and to test the research hypotheses at a 0.05 level of significance.

Result

Research Question 1: What is the influence of artificial intelligence on business educators' teaching effectiveness in public universities?

Table 1: Model Summary on the Influence of Artificial Intelligence on Business Educators' Teaching Effectiveness in Public Universities.

Model	r	R-Square	Adjusted R-Square	Standard Error
1	0.186	0.035	0.030	3.097

Table 1 showed the influence of artificial intelligence on business educators' teaching effectiveness in public universities. The r-correlation coefficient of the variable is .186 which implied that artificial intelligence influence business educators' teaching effectiveness in public universities. In addition, the influence is a positive one, this showed that as artificial intelligence increases, there is likelihood that business educators' teaching effectiveness in public universities would also increase. Table 1 also showed the coefficient of determination (Adjusted R-Square value) of 0.030. This indicates that overall, 3% of the variance in business educators' teaching effectiveness in public universities is accounted for by the sub-independent variable (artificial intelligence).

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Research Question 2: What is the influence of Internet of things on business educators' teaching effectiveness in public universities?

Table 2: Model Summary on the Influence of Internet of Things on Business Educators' Teaching Effectiveness in Public Universities.

Model	R	R-Square	Adjusted R-Square	Standard Error
1	0.544	0.296	0.293	2.645

Table 2 showed the influence of Internet of Things on business educators' teaching effectiveness in public universities. From Table 2, the R correlation coefficient of the variable is 0.544 which implied that Internet of Things influence business educators' teaching effectiveness in public universities. In addition, the influence is a positive one, this showed that as Internet of Things increases, there is likelihood that business educators' teaching effectiveness in public universities would also increase.

Research Hypothesis 1: Artificial intelligence does not significantly influence business educators' teaching effectiveness in public universities.

Table 3: Summary of Simple Linear Regression Analysis on the Significant Influence of Artificial Intelligence on Business Educators' Teaching Effectiveness in Public Universities.

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	75.433	1	75.433	7.866	0.005
Residual	2109.688	220	9.589		
Total	2185.122	221			

Note. n=222.

Table 3 showed that the F-value of 7.866 associated with p-value of 0.005 is less than 0.05 level of significance at 1 and 220 degree of freedom. Since the p-value of 0.005 is less than the 0.05 level of significance, the null hypothesis, which was previously stated as having no significant influence, is hereby rejected. This implies that artificial intelligence significantly influences business educators' teaching effectiveness in public universities.

Research Hypothesis 2: Internet of things does not significantly influence business educators' teaching effectiveness in public universities.

Table 4: Summary of Simple Linear Regression Analysis on the Significant Influence of Internet of Things on Business Educators' Teaching Effectiveness in Public Universities.

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	646.336	1	646.336	92.407	0.000
Residual	1538.785	220	6.994		
Total	2185.122	221			

Note. n=222.

Table 4 showed that the F-value of 92.407 associated with p-value of 0.000 is less than 0.05 level of significance at 1 and 220 degree of freedom. Since the p-value of 0.000 is less than the 0.05 level of significance, the null hypothesis, which was previously stated as having no significant influence, is hereby rejected. This implies that Internet of Things significantly influence business educators' teaching effectiveness in public universities.

Discussions

Artificial intelligence and business educators' teaching effectiveness in public universities in South-South Nigeria. The finding revealed that AI significantly influenced business educators' teaching effectiveness in public universities. The finding is supported by Hinojo-Lucena *et al.* (2019) assertion that AI technology is gradually being integrated into schools, spanning from basic education to higher education and adult education. These systems have the potential to enhance individuals' learning outcomes and facilitate the attainment of their educational objectives. Farooqi *et al.* (2024) also agreed with the finding. They postulated that the systematic review of the studies on nascent technologies in teaching and learning is compulsory which facilitates the teachers and students to enhance learning capabilities at school, college and university level. The finding agrees with the statement of Hwang *et al.* (2020) that AI has grown in importance within the educational community in recent years for its potential to support learning in various contexts.

In support of the finding, is what Moreno (2019) postulated that AI has great potential for

reducing the barriers to access to learning, automating management processes, and optimizing methods to improve student performance and, as a result, learning outcomes. The finding is supported by Almaraz-Menéndez *et al.* (2022) submission that AI's disruptive force also impacts higher education institutions, which need to adapt to the changes in their administrative and educational processes that this technology can bring and include training in AI in their curricula beyond computer science-focused degrees so that students in their future professional careers will be able to respond to the demands of the labor market. AI is a disruptive technology that nowadays has countless applications in many day-to-day and professional domains.

The finding corroborates the results from Olom and Atah (2025) which revealed that there is high extent in the perception of business educators on the utilization of AI in instructional preparation. Paradoxically, there was a low extent in the utilization of AI for instructional preparation; both in educational content creation and personalized instruction. There was no significant difference in the perception of business educators in colleges of education and universities on the utilization of AI in instructional preparation. There was no significant difference in the extent of utilization of AI in educational content creation and personalized instruction based on gender.

Similarly, the results from the study Adetumbi *et al.* (2022) corroborate the finding, as it showed that lecturers' perception of AI in education is highly positive. While there are no doubts as to the immense benefits that AI could bring to the field of education. However, it was also revealed that regardless of their reservations, lecturers are completely willing to adopt AI in education. Also, in line with the finding of the study is that of Afo *et al.* (2024) also revealed that AI would enhance the quality of instructional delivery in business education institutions in Cross River State, Nigeria. Furthermore, Onyemaobi and Nwatarali (2025) results is also in consonance with the finding of this study as it revealed that AI is an effective tool for teaching and learning in public institutions in Anambra State. The finding is supported by that of Ukata and Amini (2025) whose results also revealed that all the types of AI listed were highly needed to be explored, and were very highly powerful for improving the teaching of business education courses.

Internet of Things and business educators' teaching effectiveness in public universities in South-South Nigeria. The finding in this regard revealed that IoT significantly influenced business educators teaching effectiveness in public universities. The finding agrees with the statement of Nižetić *et al.* (2019) that the main goal of IoT technologies is to simplify processes in different fields, to ensure a better efficiency of systems (technologies or specific processes) and finally to improve life quality. Most importantly, IoT is progressively becoming an important aspect of our life that can be sensed everywhere around us. The integration of the IoT into business education is revolutionizing the learning environment by enhancing interactivity, personalization, and operational efficiency. IoT facilitates real-time data collection and analysis, which can significantly improve educational outcomes and business models within institutions. This transformation is evident in several key areas. On the other side, IoT technology enables the establishment of smart classrooms, in which interconnected equipment such as sensors and smartboards collect and analyze data in real time to optimize the learning environment. The finding is supported by García, Queirós and Cerqueira (2021); opinion that IoT also promotes remote and hybrid learning models by enabling seamless connection between physical and digital areas, ensuring that educational resources are available anytime and anywhere.

The infusion of IoT technologies into educational contexts heralds a profound shift in both pedagogical practice and institutional strategy. Rather than remaining tethered to fixed spaces, timeframes, and standard-issue materials, teaching and learning are becoming increasingly nimble, integrative, and data-informed. By enabling seamless access to digital courses and interactive content on any connected device, IoT diminishes the constraints of geography and traditional timetables, fostering a more learner-centric paradigm. Students are no longer confined to static print resources and instructor-led lessons; instead, they can engage with adaptive and contextually relevant educational materials that evolve in response to their cognitive progress, interests, and performance trajectories.

The finding agrees with Machour and Abriane (2024) assertion that this digital dynamism not only enriches students' experiences but also supports a more inclusive, personalized approach to education, accommodating diverse learning profiles, paces, and preferences.

Also IoT, human-to-human communications have been transformed into communication between everything and everything that refers to human-to-human, human-to-machine and machine-to-machine communications altogether. As a result, IoT has been able to capture all spheres of human life like security and privacy provisioning, health care, recycling, environmental monitoring and so on. As a powerful technology today, the Internet of Things has been applied to all walks of life, among which teaching through the background of the IoT can get better teaching results. The finding is supported by Ikenga and Egbule (2023) submission that the IoT is a global platform of interconnected devices that have been transformed from dumb and immovable physical devices into intelligent devices that can respond and act in real-time to the environment, humans, and other devices.

The finding agrees with the results from Eloanyi *et al.* (2024) who revealed that the level of utilization of IoT by lecturers in Public Institutions in Enugu State was low. Also, there was a notable gap in awareness among the lecturers, with limited exposure to IoT technologies for educational purposes. However, lecturers' knowledge gap on the use of IoT, limited infrastructure, lack of training/skills and data privacy concerns were identified as the factors mitigating the utilization of IoT by Computer Education Lecturers. Furthermore, Kasumu and Abe (2024) also found that IoT devices contribute to campus security, through the integration of surveillance cameras, access control systems and sensors and also IoT facilitates efficient management of educational resources including textbooks, equipment, and digital content. Similarly, the finding is supported by Okunnuga *et al.* (2023) who found significant response between male and female on utilization IoT for implementing teaching and learning in Technical College's in Enugu State. It was discovered that poor utilization and un updated IoT in technical colleges hinders IoT implementation for teaching and learning in technical colleges in Enugu state, hence, the utilization of IoT for implementing learning and teaching are impeded.

Conclusion

The study determined influence of nascent technologies and business educators' teaching effectiveness in public universities in South-South, Nigeria. The study revealed that AI, virtual reality, blockchain technology, ubiquitous computing, internet of things and teleconferencing significantly affect business educators teaching effectiveness in public universities in South-South Nigeria. The study also revealed that there was a significant influence of AI, virtual reality, blockchain technology, ubiquitous computing, internet of things and teleconferencing on business educators teaching effectiveness in public universities in South-South, Nigeria. Therefore, it can be concluded that while these nascent technologies exert a statistically and practically significant influence on teaching effectiveness, where they are deployed in full capacity, their full benefits can only be achieved through deliberate policy interventions. These include: substantial investment in digital infrastructure; systematic training of business educators in emerging technologies; integration of these technologies into the business education curriculum; and fostering partnerships between universities, ICT experts, and industry stakeholders. Only then will business educators in public universities across South-South Nigeria be equipped to harness these technologies to improve pedagogical delivery, enhance student engagement, and produce graduates who are competitive in a digitally driven economy. Therefore, nascent technology significantly influences business educators teaching effectiveness in public universities in South-South, Nigeria.

Recommendations

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

1. Business educators should endeavor to leverage more on the usage of AI in teaching for effectiveness and clarity on some subject matters regarding the overall growth of the

students in the foreseeable future.

2. Governments should endeavor to collaborate with institutions management to provide IoT facilities to higher institutions irrespective of the school. This would help lecturers to prepare for content delivery and enhance teaching and learning of courses in business education in South-South Nigeria.

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