

**APPLICATION OF INTELLIGENT TUTORING SYSTEM (ITS) AND
ADAPTIVE LEARNING TOOLS (ALT) IN TEACHING AND LEARNING
OF BUSINESS EDUCATION IN COLLEGES OF EDUCATION IN SOUTH
EAST NIGERIA**

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Abstract

The study investigated the extent of application of Intelligent Tutoring System (ITS) and Adaptive Learning Tools (ALT) in teaching and learning of Business Education in colleges of education in South East Nigeria. The study adopted a descriptive survey research design. Two research questions and two null hypotheses guided the study. The population consists of 100 Business Educators (37 males and 63 females). Census sampling was used because the population is manageable. The instrument for data collection was sixteen (16) item questionnaire developed by the researcher on a four-point rating scale which was validated by three research experts. The reliability was determined using Cronbach alpha statistics and it yielded a reliability coefficient of 0.85. Research questions were analyzed using Mean and Standard Deviation to ascertain the closeness and homogeneity of the responses while t-test was used to test the null hypotheses at a significance level of 0.05. Based on the findings of the study, it was concluded that the application of Intelligent Tutoring Systems and Adaptive Learning Tools in the teaching and learning of Business Education in Colleges of Education in South East Nigeria was to a high extent. There was no significant difference between the mean ratings of male and female Business Educators in colleges of education in South East, Nigeria on the extent of application of intelligent tutoring system and adaptive learning tools in teaching and learning of Business Education. The study recommended among others that Business Educators should leverage data generated by intelligent tutoring system to monitor student progress, identify learning gaps, and personalize instruction for better learning outcomes.

Keywords: Application, Intelligent tutoring system tools, Adaptive learning tools, Business Education, Teaching

Introduction

Today's technology has become an unavoidable part of the passage of time. Technology has not only changed people's lifestyles but has also changed how we work, learn, and interact. Various kinds of innovations appear all the time, making our activities and work more practical and effective. In envisioning future jobs and human resources specialists' requirements, teachers must equip students with a proficiency that makes them adaptable to challenges. Educators significantly contribute to society by educating the students to fit into the current world of work. Tan (2020) underlines that the educators exerts a triple role, being a content expert and creator, a knowledge spreader, and an ethical-spiritual guide with wisdom. For a considerable amount of time, people have held the belief that Business Education is crucial to their success in the workforce. In an era of rapidly changing global market dynamics and rapid technological advancement, the need of Business Education has increased even further.

Business Education refers to the study and teaching of various subjects and skills related to business management, administration, and operations. Its goal is to equip individuals with the knowledge and practical abilities necessary to succeed in the business world. According to Ezeabii (2017), Business Education is an aspect of vocational education which equips individuals with the necessary skills and theoretical knowledge needed for performance in the business world either for job or self-employment. Business Education is a specialized programme of instruction designed to provide individual with knowledge, skills and attitude for occupational work and advancement (Obidile & Onyeagba, 2019). According to Emeasoba (2015) Business Education is a vocational education that prepares beneficiaries for gainful employment and sustainable livelihood. The objectives of Business Education generally are borne out of the needs of industry, commerce, and society. It is a field of study which prepares its recipients with relevant competencies needed to be productive in the society. Business Education programme strives to achieve these aims by preparing their students for the world of work either as employees or employers of labour (Wey & Wolugbom, 2018). It provides training, experience, knowledge and skills which could enable their students achieve self-reliance after graduation. Similarly, Inegbedion, Njoku, Ekpenyong, Umoru and Liadi (2016) defined Business Education as a course that prepares students for entry into and advancement in jobs within business and it is equally important because it prepares students to handle their own business affairs and to function intelligently as consumers and citizens in a business economy.

Business Education according to Ibrahim and Yakubu (2018) is the teaching of skills, attitude and knowledge needed for success in a business career. In the opinion of Azuka and Nwosu (2018) Business Education is an educational programme that equips an individual with functional and suitable skills, knowledge, attitudes and values that enables him/her to operate in the environment he/she finds himself/herself in. This implies that Business Educators should teach their students to acquire and apply business skills in order to become economically self-reliant and productive in the business world. In the same vein, Edokpolor and Egberi (2017) stipulated that the actual goals of Business Education are to: prepare students for specific career in office occupations, equip students with the requisite skills for job creation and entrepreneurship; and expose students with knowledge about business, including

a good blend of computer technology, which incorporates Information and Communication Technology (ICT). Business Education prepares beneficiaries for gainful employment and sustainable livelihood through the teaching and learning process.

Teaching can be defined as the process through which an educator, or facilitator, provides instruction, guidance, and resources to students to help them acquire knowledge, skills, and attitudes necessary for personal, academic, or professional development. Teaching involves the use of specific strategies, methodologies, tools, and activities that foster learning and engagement. The information, abilities, and skills needed to manage difficult work situations are imparted to learners through teaching. Teaching is no longer seen as a mere transfer of knowledge; it is increasingly viewed as facilitating learning. Teachers create an environment where students can actively engage with material, develop their own understanding, and apply concepts in real-world contexts (Barkley, 2016). With a growing focus on student-centered learning, teaching today emphasizes empowering students to take ownership of their learning process. This includes adopting methods like active learning, flipped classrooms, and personalized learning (Zhao, 2018). Learning is the process by which individuals acquire knowledge, skills, attitudes, and values through experience, study, or teaching. It can be viewed as a transformation of the learner's cognitive, emotional, and social states, where new information is integrated into existing mental frameworks. Learning is increasingly understood as an active process of constructing knowledge rather than passively receiving information (Thomas, 2018). Digital tools and platforms have transformed the way students learn. The use of online courses, simulations, virtual environments, and artificial intelligence (AI)-driven personalized learning has made learning more flexible, scalable, and adaptive (Siemens, 2017). In a rapidly changing world, Teaching and learning is no longer confined to formal educational settings. Business Education is a specialized branch of education that focuses on teaching students the skills, knowledge, and competencies needed to succeed in the world of business. Artificial intelligence in the teaching and learning in Business Education is crucial for creating environments where students acquire both theoretical knowledge and practical skills.

Artificial intelligence or (AI) is a technology where machines can learn and understand logic like humans. This technology is said to be able to help simplify human life which is very complex (Fitria, 2021). Artificial intelligence augments human skills in the workplace (Nuseir, Basheer & Aljumah, 2020) and serves as an educational partner, enhancing content and competencies (Tan, 2020). Elhajjar, Karam and Borna (2021) advocate integrating Artificial intelligence into education to equip students with skills essential for future jobs and digital society's demands, such as innovation, creativity, and design thinking. Artificial intelligence employs diverse tools, techniques, and systems in educational activities (McGrath et al., 2023). Investing in human capital to embrace Artificial intelligence tools is vital for societal development, despite widespread distrust and misconceptions about AI's role in human activities, especially in education (Antonenko & Abramowitz, 2023). This technology has an important role in facilitating various job functions, including in the field of education. AI can also be implemented in the world of education. Teachers/lecturers can understand student needs more easily and more deeply (Fitria, 2021). The students also can learn according to their needs without encountering difficulties. According to Bakare, Abioye, and Isa (2016), the integration of AI in education not only improves the efficiency and

effectiveness of teaching but also prepares students for the dynamic and technology-driven business landscape. Eze-Desy and Emeasoba (2024) noted that through the use of artificial intelligence, education have the ability to construct dynamic and interactive learning environments that accommodate the various learning styles and capabilities of students. It is the ability of a digital computer, computer-controlled machine or robot to perform tasks commonly associated with intelligent beings like human. As AI continues to evolve, its applications in business education are expanding, offering new opportunities for both educators and learners. Business Educators bear a considerable obligation to prepare students for success in the constantly changing business world. As industries evolve and new technologies emerge, the demand for professionals who can adapt quickly and make informed decisions is higher than ever. Hence, the demand for innovative educators embracing change, integrating new materials, and enabling student-AI interactions in education is increasing. Artificial intelligence (AI)-based tools have the potential to alter fundamentally how education is delivered and consumed. Among these tools are computer vision, natural language processing, machine learning, virtual mentoring, voice assistant, smart content, cram 101, netex learning presentation translator, automatic assessment, personalized learning, intelligent tutoring system, collaborative learning, educational games (ITS) and adaptive learning (Fitra, 2021). All these AI tools encourages critical thinking in the students, improve problem solving abilities, makes the students self-reliant and self-management. Nevertheless, this study is delimited to intelligent tutoring system and adaptive learning tools.

Intelligent Tutoring refers to the use of computer-based systems that provide personalized instruction or feedback to learners, often mimicking the guidance of a human tutor. These systems are powered by artificial intelligence (AI) and are designed to adapt to individual students' needs, learning pace, and understanding level. It is one of the developments of an expert system on artificial intelligence in the field of learning. Examples of Intelligent Tutoring System (ITS) are Intelligent Tutoring System (ITS) Based on Augmented Reality (AR) for Dimensional Geometry Material, Intelligent Tutoring System for Nun Sukun or Tanwin law learning, Intelligent Tutoring System (ITS) for circular learning, and various other ITS. (Abu-Ghali et al., 2018) stated that The Intelligent Tutoring System (ITS) is a computer program that provides students with personalized education and feedback without the need for human intervention. The intelligent tutoring system was provided to a group of students of all ages to test out and observe how it affected them. The system adjusts to each student's unique characteristics and progresses them from an easier to a more difficult level (Alhabbash et al., 2016). Intelligent Tutoring System (ITS) with personalized learning in the teaching and learning of Business Education ensures that students receive not only the flexibility to learn at their own pace but also the support and guidance necessary to excel in areas they find challenging. It provides tailored feedback, adaptive learning paths, and real-time simulations, all of which reinforce the personalized approach to Business Education.

Adaptive learning is an AI-powered adaptive learning platform that personalizes educational experiences by analyzing student performance and adjusting content delivery based on individual needs. Its core function is to provide personalized recommendations and adaptive learning pathways for students, ensuring they receive the right content at the right time (Kim, 2018). In the context of Business Education, Adaptive learning tool helps educators and students by offering tailored learning experiences in business subjects like finance, marketing,

economics, and management. The platform uses machine learning to analyze students' strengths, weaknesses, and learning behaviors, adjusting the curriculum accordingly to optimize understanding and retention. According to Bogle and Robinson (2016), the use of adaptive learning tool in Business Education course where students' learning paths are personalized and will show significant improvement in student retention and engagement, with students mastering of the course. According to Emeasoba and Akiebie (2024), adaptive learning uses data driven algorithms and artificial intelligence to adjust the content, the delivery and the pace of instruction. It promotes efficiency in instructional delivery and enhances the achievement of educational objectives. The need for flexible, individualized instruction as well as efficient resource management has fuelled the advancement of artificial intelligence (AI) in education. Artificial intelligence (AI)-powered tools and systems are already being used in classrooms, offering new chances to enhance teaching methods (Jibril et al., 2018). The extent this program achieves its noble objectives depends, to a very large extent on the quality and competencies possessed by the educators as well as the artificial intelligence tools they apply to facilitate effective teaching and learning of Business Education in colleges of education. The goals of Business Education programme are to produce well-qualified graduates capable of teaching courses on Business Education (Olowe, 2023). To achieve these goals, specific entry requirements, essential facilities and modern technology such as AI are indispensable in the actualization of Business Education goals and objectives in tertiary institutions in Nigeria including the Colleges of Education.

College of Education is an educational institution that specializes in training individuals to become professional educators, typically focusing on the preparation of teachers for primary, secondary, or higher education levels. College of Education according to Tsojon and Gidado (2017) is principally a teacher training institution established to produce teachers to teach at the secondary schools. They are tertiary educational institutions that prepare intermediate level teachers for a minimum of three years to make them qualify to teach their respective subjects. In Nigeria, Colleges of Education play a pivotal role in shaping the future educators and professionals in various disciplines. Therefore integration of technologies such as AI tools in the implementation of any curriculum such as Business Education remain imperative in colleges of education. The College of Education (CoE) in Nigeria plays a vital role in the education system by training prospective teachers who will go on to serve in various educational institutions at the primary and secondary levels. Colleges of Education are part of Nigeria's tertiary education structure, and their primary goal is to prepare students with the necessary skills and knowledge to become effective educators (Olaniyan & Olatoye 2021). Over the past decade the role and functionality of Colleges of Education in Nigeria have evolved due to various reforms in education policies, expansion of curriculum offerings, and a greater emphasis on improving the quality of teaching and learning.

Basically, gender is an important variable to consider in this study. Gender refers to the roles, behaviors, activities, and attributes that a given society considers appropriate for men, women, and other gender identities. According to Abdul-Raheem (2020), gender involves the roles, attitudes, behavior and values ascribed by the society to males and female. Gender is a socio-cultural construct that connotes the differentiated roles and responsibilities of men and women in a particular society. This means that gender determines the role which one plays in the society even in educational context (Singh & Aggarwal, 2020). It is enforced, through culture

practices. Hence, the type of training and exposures given to male and female individuals in a given society depend on the people's understanding and belief. Gender, therefore is a very important variable because a person's personal orientation and outlook play a crucial role in performance.

Despite the perceived benefits of intelligent tutoring system and adaptive learning tools to Business Education lecturers, students, individual and organizations in this current world of work, the teaching of Business Education courses by Business Education lecturers in south east appears not to be effective as the performance of graduates of Business Education in today's world of work has remained consistently low over the years. Business Education at this level is offered in colleges of education and this influenced the researcher's choice of using it as variable in this study so as to fill the gap of this study. The study therefore attempts to ascertain the extent of application of intelligent tutoring system and adaptive learning tools in teaching and learning of Business Education in colleges of education in South East Nigeria.

Statement of the Problem

Business Education is focused on equipping the students' with skills, knowledge and competencies required for effective and efficient performance in the business world and the society at large. The advent of mass higher education has produced a shift from the teaching methods in colleges of education which brings about the nature, effectiveness and relationship between teaching and learning strategies adopted by the lecturers or educators. Consequently, teaching methods are now being re-examined and re-assessed because of changes in the world of work and society as a result of the artificial intelligence tools in the teaching method. This demand has sifted lecturers/educators to creative and innovative teaching methods. Studies have shown that Business Education students upon graduation performs poorly in businesses and the world of work in south east and other states in Nigeria due to the deficiency in a lot of skills/competencies needed to fit in to the current world of work. The question one may ask is what are the basic skills or tools needed effectively and efficiently in teaching and learning of Business Education? It is against this background therefore, that this study attempts to ascertain the extent of application of intelligent tutoring system and adaptive learning tools in teaching and learning of Business Education in colleges of education in south east Nigeria.

Purpose of the Study

The purpose of the study was to determine the extent of application of intelligent tutoring system and adaptive learning tools in teaching and learning of Business Education in colleges of education in south east Nigeria. Specifically, the study sought to determine:

1. the extent of application of intelligent tutoring system tool in teaching and learning of Business Education in colleges of education in south east Nigeria.
2. the extent of application of adaptive learning tool in teaching and learning of Business Education in colleges of education in south east Nigeria.

Research Questions

The following research questions guided this study.

1. What is the extent of application of intelligent tutoring system tool in teaching and learning of Business Education in colleges of education in south east Nigeria?

2. What is the extent of application of adaptive learning tool in teaching and learning of Business Education in colleges of education in south east Nigeria?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance

- H0₁. There is no significant difference between the mean ratings of male and female Business Education lecturers in colleges of education in South East, Nigeria on the extent of application of intelligent tutoring system tool in teaching and learning of Business Education.
- H0₂. There is no significant difference between the mean ratings of male and female Business Education lecturers in colleges of education in South East, Nigeria on the extent of application of adaptive learning tool in teaching and learning of Business Education.

Methodology

The study adopted a descriptive survey research design. The design is appropriate because it allows for the collection of quantitative data from a sample of respondents on the application of intelligent tutoring system and adaptive learning tools in teaching and learning of Business Education in colleges of education in south east Nigeria. Two research questions guided the study and two null hypotheses which were tested at a significance level of 0.05. The target population consists of 100 Business Educators in colleges of education in South-East, Nigeria which comprised of 37 male and 63 female Business Educators. The entire population was used because the population is of a manageable, therefore census sampling was used. The instrument for data collection was made up of sixteen (16) item statements developed by the researcher with four-point rating scale of Very High Extent (VHE), High Extent (HE), Low Extent (LE) and Very Low Extent (VLE) with corresponding values of 4, 3, 2 and 1 respectively which was validated by three research experts. To establish the reliability of the instrument copies of the questionnaire was administered to twenty (20) Business Educators in The Federal College of Education (technical), Omoku, Rivers State who were not part of the population of the study but had similar characteristics. The reliability of the instrument was determined using test-retest technique. 100% of the instrument distributed to the respondents were fully retrieved. Data obtained from the administrations were analyzed with Cronbach alpha statistics and it yielded a reliability coefficient of 0.85. The value was considered reliable and appropriate for the study. Data collected from respondents as regards the research questions were analyzed using Mean and Standard Deviation while t-test was used to test the null hypotheses at a significance level of 0.05. Decision rule for the research questions was based on an average mean score of 2.50 while the null hypotheses were based on t-critical value. If the t-calculated is less than the t-critical, the null hypothesis was accepted and if otherwise, rejected. Real limit of number was used to determine the level or extent of responses of each item on research questions only. The real limit value is as follows; 3.50-4.00= Very high extent, 2.50-3.49=High extent, 1.50-2.49=Low extent, 1.00-1.49=Very low extent. The null hypothesis was accepted when the t-calculated value is less than the t-table value at 0.05 level of significance while the hypothesis was rejected when the t-calculated value is greater than the t-table value at 0.05 level of significance.

Results

Research Question One: What is the extent of application of intelligent tutoring system tool in teaching and learning of Business Education in colleges of education in south east Nigeria?

Table 1: Mean Ratings of respondents on the extent of application of intelligent tutoring system tool in teaching and learning of Business Education
N=100

S/N	Item Statement	$\bar{x}$	SD	Remark
1.	The use of intelligent tutoring system tools in Business Education encourages students to take initiative in their learning.	3.39	0.71	High Extent
2.	The accessibility of intelligent tutoring system tools improves students' ability to study Business Education content outside the class.	3.42	0.73	High Extent
3.	Application of intelligent tutoring system tools has led to improved student satisfaction in Business Education courses	3.47	0.81	High Extent
4.	The use of intelligent tutoring system tools helps the students better retain and understand key Business Education concepts.	3.45	0.75	High Extent
5.	The use of intelligent tutoring system tools allows students to apply theoretical knowledge in practical Business Education scenarios.	3.44	0.74	High Extent
6.	Intelligent tutoring system tools are effective in improving students' academic performance in Business Education.	3.54	0.77	Very High Extent
7.	Application of intelligent tutoring system tools improve students' understanding of complex Business Education topics.	3.81	0.86	Very High Extent
8.	The use of intelligent tutoring system tools foster independent learning among Business Education students.	3.48	0.81	High Extent
	Grand Mean	3.50	0.77	Very High Extent

Where $\bar{X}$ = Mean, SD = Standard deviation, VHE=Very High Extent, HE=High Extent, LE=Low Extent, VLE=Very Low Extent

Table 1 shows a grand mean of 3.50 on the extent of application of intelligent tutoring system tool in teaching and learning of Business Education in colleges of education in south east Nigeria, which is above the bench mark of 2.50. The item by item analysis reveals that item 1, 2, 3, 4, 5 and 8 with mean score ranging from 3.39 to 3.48 revealed that the respondents agreed to a high extent that the application of intelligent tutoring system tool improves the teaching and learning of Business Education in colleges of education in south east Nigeria while item 6 and 7 with mean score of 3.54 and 3.81 revealed that the respondents agreed to a very high extent that the application of intelligent tutoring system tool improves the teaching and learning of Business Education in colleges of education in south east Nigeria. The standard deviations for all the items are within the same range showing that the respondents are not far apart in their ratings.

Research Question Two: What is the extent of application of adaptive learning tool in teaching and learning of Business Education in colleges of education in south east Nigeria?

Table 2: Mean Ratings of respondents on the extent of application of adaptive learning tool in teaching and learning of Business Education
N=100

S/N	Item Statement	$\bar{x}$	SD	Remark
9.	The use of adaptive learning tool helps to assess students' current knowledge and adjust content accordingly in Business Education.	3.48	0.79	High Extent
10.	The application of adaptive learning tools by Business Educators helps monitor student progress in real-time.	3.67	0.85	Very High Extent
11.	The adaptive learning tool provides Business Education students with instant feedback on their performance.	3.50	0.76	Very High Extent
12.	The use of adaptive learning tools by Business Educators helps personalize the learning experience for students.	3.28	0.78	High Extent
13.	The use of adaptive learning tools has increased student engagement in Business Education courses.	3.67	0.85	Very High Extent
14.	Adaptive learning tools offer Business Education students an opportunity to revisit topics they find difficult, enhancing their retention.	3.79	0.93	Very High Extent
15.	The use of adaptive learning tool by Business Educators helps adjust their teaching methods based on student performance.	3.55	0.82	Very High Extent
16.	Business Educators requires adequate training and support to use adaptive learning tools effectively.	3.69	0.83	Very High Extent
	Grand Mean	3.58	0.83	Very High Extent

Where $\bar{X}$ = Mean, SD = Standard deviation, VHE=Very High Extent, HE=High Extent, LE=Low Extent, VLE=Very Low Extent

Table 2 shows a grand mean of 3.58 on the extent of application of adaptive learning tool in teaching and learning of Business Education in colleges of education in south east Nigeria, which is above the bench mark of 2.50. The item by item analysis reveals that item 9 and 12 with mean score of 3.48 and 3.28 revealed that the respondents agreed to a high extent that the application of adaptive learning tool improves the teaching and learning of Business Education in colleges of education in south east Nigeria while item 10, 11, 13, 14, 15 and 16 with mean score ranging from 3.50 to 3.79 revealed that the respondents agreed to a very high extent that the application of adaptive learning tool improves the teaching and learning of Business Education in colleges of education in south east Nigeria. The standard deviations for all the items are within the same range showing that the respondents are not wide apart in their ratings.

Hypothesis One: There is no significant difference between the mean ratings of male and female Business Education lecturers in colleges of education in South East, Nigeria on the extent of application of intelligent tutoring system tool in teaching and learning of Business Education.

Table 3: Summary of t-test analysis of difference in mean response of male and female Business Education lecturers in colleges of education in South East, Nigeria on the extent of application of intelligent tutoring system tool in teaching and learning of Business Education

Business Educators	N	$\bar{x}$	SD	DF	t-cal	t-crit	Decision
Male	37	3.53	0.76	98	0.26	1.98	Not sig
Female	63	3.49	0.71				

Where N = Number of respondents, X = Mean, SD = Standard deviation, DF = Degree of freedom, NS = Not Significant

Data in Table 3 reveals a t-calculated value of 0.26 which is less than the t-critical value of 1.98 at 0.05 level of significance. The analysis depicts a null hypothesis of no significance. Therefore, the null hypothesis which states that there is no significant difference between the mean ratings of male and female Business Educators in colleges of education in South East, Nigeria on the extent of application of intelligent tutoring system tool in teaching and learning of Business Education is retained.

Hypothesis Two: There is no significant difference between the mean ratings of male and female Business Education lecturers in colleges of education in South East, Nigeria on the extent of application of adaptive learning tool in teaching and learning of Business Education.

Table 4: Summary of t-test analysis of difference in mean response of male and female Business Education lecturers in colleges of education in South East, Nigeria on the extent of application of adaptive learning tool in teaching and learning of Business Education

Business Educators	N	$\bar{x}$	SD	DF	t-cal	t-crit	Decision
Male	37	3.67	0.81	98	0.80	1.98	Not sig
Female	63	3.54	0.76				

Data in Table 4 reveals a t-calculated value of 0.80 which is less than the t-critical value of 1.98 at 0.05 level of significance. The analysis depicts a null hypothesis of no significance. Therefore, the null hypothesis which states that there is no significant difference between the mean ratings of male and female Business Educators in colleges of education in South East, Nigeria on the extent of application of adaptive learning tool in teaching and learning of Business Education is retained.

Where N = Number of respondents, X = Mean, SD = Standard deviation, DF = Degree of freedom, NS = Not Significant

Discussion of Findings

The findings of the study were discussed in line with the research questions and the tested hypotheses. The result of research question one reveals the mean and standard deviation of respondents on the extent of application of intelligent tutoring system tool in teaching and learning of Business Education in colleges of education in south east Nigeria. With an aggregate mean score of 3.50 above the bench mark of 2.50, it implies that the application of intelligent tutoring system tool improves the teaching and learning of Business Education in colleges of education in south east Nigeria to a very high extent. With a corresponding

hypothesis which revealed that the null hypothesis which states that there is no significant difference between the mean ratings of male and female Business Education lecturers in colleges of education in South East, Nigeria on the extent of application of intelligent tutoring system tool in teaching and learning of Business Education is retained. The finding are in agreement with the finding of Abu-Ghali et al., (2018) who affirmed that Intelligent Tutoring System (ITS) provides students with personalized education and feedback without the need for human intervention and also adjusts to each student's unique characteristics. Intelligent tutoring system not only gives the students flexibility to learn at their own pace but also provides the support and guidance necessary to excel in areas they find challenging. It provides tailored feedback and real-time simulations.

The result of research question two reveals the mean and standard deviation of respondents on the extent of application of adaptive learning tool in teaching and learning of Business Education in colleges of education in south east Nigeria. With an aggregate mean score of 3.58 above the bench mark of 2.50, it implies that the application of adaptive learning tool improves the teaching and learning of Business Education in colleges of education in south east Nigeria to a very high extent. With a corresponding hypothesis which revealed that the null hypothesis which states that there is no significant difference between the mean ratings of male and female Business Education lecturers in colleges of education in South East, Nigeria on the extent of application of adaptive learning tool in teaching and learning of Business Education is retained. The finding of is in line with the finding of Kim (2018) which averred that adaptive learning tool helps educators and students by offering tailored learning experiences in business subjects like finance, marketing, economics, and management. The platform uses machine learning to analyze students' strengths, weaknesses, and learning behaviors, adjusting the curriculum accordingly to optimize understanding and retention.

Conclusion

Based on the findings of the study, it was concluded that the application of Intelligent Tutoring Systems and Adaptive Learning Tools in the teaching and learning of Business Education in Colleges of Education in South East Nigeria was to a high extent. Intelligent Tutoring Systems and Adaptive Learning Tools has demonstrated significant potential to enhance educational outcomes. These technologies support personalized learning, foster critical thinking, and equip students with essential skills needed for the modern workforce. As the education landscape continues to evolve, integrating intelligent tutoring system and adaptive learning solutions will not only improve the teaching-learning process but also contribute to building a more dynamic and innovative educational environment.

Recommendations

The following recommendations were made by the researcher based on the findings of the study

1. Business Educators should leverage data generated by intelligent tutoring system to monitor student progress, identify learning gaps, and personalize instruction for better learning outcomes.
2. Business Educators should receive ongoing training on how to effectively integrate adaptive learning tools in teaching Business Education, maximizing their benefits.

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