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INTEGRATING INTELLIGENT TUTORING SYSTEMS INTO BUSINESS EDUCATION PROGRAMME: AN EXAMINATION OF BENEFITS AND CHALLENGES IN DELTA STATE PUBLIC TERTIARY INSTITUTIONS

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Abstract

The study examined the benefits and problems of integrating Intelligent Tutoring Systems (ITS) into business education programme in Delta State public tertiary institutions. The study explored two research questions and tested two hypotheses, using a 0.05 significance level. The study used a descriptive survey design to gather and analyze data from a population comprising 139 business educators in the five public tertiary institutions in Delta State that run business education programme. The entire population was studied with no sampling due to its manageable size. Data for the study were gathered using a structured questionnaire designed by the researcher which was reviewed by three renowned experts to confirm its validity. The reliability conducted through a pilot study yielded an overall co-efficient of 0.82. The data collected from the respondents were analyzed using mean scores, standard deviation and independent-sampes t-test. The study found that integrating intelligent tutoring system into business education programme in public tertiary institutions in Delta State can improve students' engagement in learning activities, facilitate better curriculum design by analyzing patterns in student learning behaviours, enhance personalized learning by adapting teaching methods to meet individual students' needs and reduce the workload of lecturers by automating tasks like grading among others. It was also found that the problems inhibiting the integration of intelligent tutoring systems into business education at public tertiary institutions in Delta State included limited funding for technological innovations, decrease in face-to-face interactions between students and lecturers which could impede the development of critical communication skills among others. One of the recommendations of the research is that federal and states governments, in collaboration with management of tertiary institutions as well as technology companies should set up an endowment fund to provide infrastructural facilities, funding, and expertise for the integration of intelligent tutoring systems into business education programme in public tertiary institutions.

Keywords: *Benefits, Problems, Integration, Intelligent Tutoring Systems, Business Education*

INTRODUCTION

In recent decades, the evolution of Information and Communication Technology (ICT) has been changing the way human activities are carried out. The ICT revolution is advancing at a rapid pace especially with emergence of Artificial Intelligence (AI). According to Al-Qadi and Abu-Naser, (2024), artificial intelligence is a subfield of computer science that aims to create systems that can perform tasks typically requiring human intelligence, including cognitive functions such as reasoning, learning, and problem-solving. AI is transforming education by improving teaching techniques, increasing accessibility and customizing learning experiences. Notably, Intelligent Tutoring Systems (ITS), a significant artificial intelligence component, are garnering considerable attention and acceptance in the educational sector due to its potentials to revolutionize learning.

Intelligent Tutoring Systems imitate one-on-one tutoring by giving students rapid feedback and tailored advice. ITS adjust to individual learning demands, ensuring that students may get aid whenever they need it. Intelligent Tutoring Systems are computer-based educational platforms that provide autonomous knowledge bases for both educational materials and instructional methodologies (Alkhatlan & Kalita, 2018). In the view of Ali et al. (2018), an intelligent tutoring system as computer software that leverages a learner's ideas to aid independent learning. An intelligent tutor system uses application tools to foster the abilities, behavior, and suggestions of a human educator. Furthermore, Alrakhaw et al. (2023) noted that Intelligent Tutoring Systems consisted of four major models: student model, expert model, educational knowledge model, and interface model. The expert model provides a baseline for expert activities thereby allowing the students to be evaluated against that standard.

Intelligent Tutoring Systems (ITS) dynamically create personalized learner models to address a range of problems or scenarios. These systems foster individual learning while offering the necessary support. Intelligent Tutoring System showcases the potential of AI to significantly enhance educational outcomes. Nakhal and Bashhar (2017) found that learners who regularly deploy ITS often perform higher than their counterparts in traditional face-to-face settings. As AI continues to be integrated into educational settings, Intelligent Tutoring System stands out as a valuable tool for boosting student engagement and helping them grasp complex concepts. Marouf et al. (2024) asserted that Intelligent Tutoring Systems (ITS) provide individualized and adaptable learning experiences directed to each learner's peculiarity which represents a vital change from traditional classroom system. These systems employ AI models like the natural language processing, machine learning, and adaptive algorithms to simulate personalized coaching, offering real-time feedback and support. Mosa et al. (2018) emphasized that ITS aim to assess a learner's understanding of various topics, identifying their strengths and weaknesses, and dynamically adjust the learning process to meet individual needs. By personalizing the learning experience, ITS can improve educational outcomes. However, despite their numerous benefits, there are challenges that hinder the widespread adoption of ITS. Ammar (2017) highlighted the significance of Intelligent Tutoring Systems (ITS) in personalized education, but also emphasized the need to address critical concerns related to data protection, system bias issues, and regular updates for optimal effectiveness and equitable outcomes. Alsaqqa et al. (2022) also noted concerns regarding student data protection and privacy, system bias issues, and the necessity for regular maintenance to keep paste with ever emerging educational processes and practices. Furthermore, Alsharif and Ali (2016) observed that the efficiency of the intelligent tutoring systems can differ depending on the standard of the algorithms deployed and the level of human interactions involved. However, these challenges have yet to be empirically proven within the context of business education programmes in tertiary institutions in Delta State.

Business education programme at the level of tertiary institution is a training programme that produces individuals for the world of work. Azuka and Nwosu (2018) defined business education to be a subset of technical and vocational education programme characterized as education aimed at producing skilled labour. It is a type of education, training, or retraining designed to prepare individuals for roles in the public sectors or for self-employment in the business sector. According to Okoli in Okeke and Anogbogu (2023), the business education programme as a crucial component of education focuses on the development of attitudes, knowledge and skills necessary for office and business-related occupations. Business education is recognized as both an education for business and about business, as it provides not only a general understanding of the business world, but also prepares students for professional careers in the workforce (Onyesom & Igberaharha, 2021). Business education aims to develop basic skills for future use, contribute to national development, and prepare students for future studies in business fields. It also equips students with foundational skills for career orientation (Nwazor & Onokpaunu, 2016).

One issue with the integration of Intelligent Tutoring Systems (ITS) in business education programme in institutions of higher learning in Delta State may be varying technological experiences among business educators. Gcabashe and Ndlovu (2022) noted that many educators lack familiarity with advanced educational technologies and this could lead to skepticism about the effectiveness and benefits of ITS. Accordingly, Omar and Ismail (2021) stated that self-efficacy of technology has significant influence on educators' willingness to adopt such systems, with some maintaining traditional methods and others struggling due to insufficient training or resources. These views have not been empirically proven in business education programme in tertiary institutions in Delta State. Following this background, this study was set out to examine the benefits and problems of integrating intelligent tutoring systems in business education programme in public tertiary institutions in Delta State.

Statement of the Problem

The problem of the study is that observations by the researcher seem to show that business educators are still dependent on traditional methods of delivering lectures in the business education programme. These traditional systems appear to be burdensome, piling a lot of stress on both students and lecturers. Students are often packed into lecture halls, struggling to make sense of what is being discussed, which affects their ability to grasp key concepts. The researcher wonders if the deployment of Intelligent Tutoring Systems (ITS) could offer an avenue to improve the situation and potentially enhance students' understanding and engagement in business education programme. Focusing on the foregoing, the researcher examined the benefits and problems of integrating intelligent tutoring systems in business education in public tertiary institutions in Delta State.

Research Questions

1.What are the benefits of integrating intelligent tutoring systems in business education programme in public tertiary institutions in Delta State?

2.What are the problems inhibiting the integration of intelligent tutoring systems into business education programmes in public tertiary institutions in Delta State?

Hypotheses

1.There is no significant difference in the opinions of business educators who have experience with intelligent tutoring systems and those without experience in intelligent tutoring systems

on the benefits of integrating intelligent tutoring system in business education programme in public tertiary institutions in Delta State.

2.There is no significant difference in the opinions of business educators who have experience with intelligent tutoring systems and those without experience in intelligent tutoring systems on the problems inhibiting the integration of intelligent tutoring system in business education programme in public tertiary institutions in Delta State.

Methods

To achieve the research purposes, the study used a descriptive survey design to gather and analyse data from a population comprising 139 business educators in the five public tertiary institutions in Delta State that run business education programme. The institutions are the University of Delta, Agbor (21), Delta State University, Abraka (20); Federal College of Education (Technical), Asaba (62); College of Education, Warri (19) and College of Education, Mosogar (17). The whole population was studied with no sampling because of its manageable size. Data for the study were gathered using a structured questionnaire designed by the researcher, titled "Questionnaire on Benefits and Problems Inhibiting the Integration of Intelligent Tutoring Systems in Public Tertiary Institutions (QBPIIITSPTI)." The questionnaire was composed of two sections: Section A, which gathered information on the respondents' experience with intelligent tutoring systems, and Section B, which contained 20 items divided into two clusters. Cluster B1 consisted of 10 items focused on the benefits of integrating intelligent tutoring systems in public tertiary institutions, while Cluster B2 included 10 items on the problems inhibiting the integration of ITS in intelligent tutoring systems in public tertiary institutions.

The questionnaire was subjected to a thorough review conducted by three distinguished professionals from the Faculty of Education, University of Delta, Agbor to confirm its validity. To determine the reliability of the questionnaire, it was subjected to a pilot testing with 20 business education lecturers in public tertiary institutions in Anambra State. The reliability test using Cronbach Alpha yielded coefficients of 0.83 and 0.81 for B1 and B2 of the questionnaire accordingly with overall coefficient of 0.82. The researcher, helped by three lecturers from the covered tertiary institutions, distributed and collected the questionnaire. From the 139 copies of the questionnaire distributed, 135 were retrieved successfully upon completion and used for the study. The data collected from the respondents were analyzed using mean scores, standard deviation and independent t-test. Mean rating was used to determine the central tendency, providing the typical value of a variable, while the standard deviation assessed the variability or consistency of the respondents' ratings. A four-point rating scale was used, with mean values of 2.50 or above indicating agree and below 2.50 indicating disagree. To test the hypotheses, t-test was employed. The p-value was compared with the level of significance (0.05). If the p-value was less than or equal to 0.05, the null hypothesis was considered significant and rejected. If the p-value was greater than 0.05, the null hypothesis was deemed not significant and was not rejected.

Results

The data obtained from the field were collated and analyzed, and the results are shown in the following tables.

Research Question One

What are the benefits of integrating intelligent tutoring system in business education programme in public tertiary institutions in Delta State?

Table 1: Mean Ratings of the Benefits of Integrating Intelligent Tutoring Systems into Business Education Programme

S/N	Item Statements	Mean	SD	Remarks
1.	Intelligent Tutoring Systems (ITS) can enhance personalized learning by adapting teaching methods to meet individual students' needs.	3.13	0.70	Agree
2.	The use of ITS can improve students' engagement in learning activities.	3.23	0.87	Agree
3.	ITS provides opportunities to identify students' weaknesses more effectively than traditional teaching methods.	3.26	0.69	Agree
4.	The implementation of ITS can reduce the workload of lecturers by automating routine tasks like grading.	3.21	0.78	Agree
5.	ITS offers a platform for lecturers to improve their teaching strategies through data-driven insights about student performance.	3.11	0.80	Agree
6.	Adopting ITS in public tertiary institutions can enhance the quality of education by integrating innovative teaching techniques.	3.29	0.66	Agree
7.	ITS have the potential to improve students' academic outcomes by providing real-time support for students.	3.27	0.76	Agree
8.	The use of ITS can promote collaborative learning among students by incorporating interactive technologies.	3.22	0.81	Agree
9.	ITS provides opportunities for students to learn at their own pace which promotes independent study habits.	3.34	0.70	Agree
10.	The use of ITS can facilitate better curriculum design by analyzing patterns in student learning behaviours.	2.89	0.79	Agree
	Cluster Mean	**3.20**		**Agree**

As presented in Table 1, the results indicate that items 1-10 represent the benefits of incorporating Intelligent Tutoring Systems (ITS) into business education programmme at public tertiary institutions in Delta State, with mean ratings indicating a moderate to high level of agreement (2.89 to 3.34). The standard deviation scores ranging between 0.66 and 0.87 indicates that the opinions of the respondents were close. Furthermore, the mean of the cluster which is 3.20 shows that the benefits of integrating intelligent tutoring system in business education programmes in business education programmes in public tertiary institutions in Delta State are that the use of ITS can improve students' engagement in learning activities, facilitate better curriculum design by analysing patterns in student learning behaviours, enhance personalized learning by adapting teaching methods to meet individual students' needs and reduce the workload of lecturers by automating routine tasks like grading among others.

Research Question Two

What are the problems inhibiting the integration of intelligent tutoring system in business education programmes in public tertiary institutions in Delta State?

Table 2: Mean Ratings of the Challenges of Utilizing Intelligent Tutoring Systems in Business Education

S/N	Item Statements	Mean	SD	Remarks
1.	The lack of awareness about Intelligent Tutoring Systems among lecturers hinders their adoption.	3.45	0.83	Agree
2.	Insufficient training on how to integrate ITS into teaching.	3.20	0.78	Agree
3.	Costs of acquiring ITS technology are very high for public universities.	3.15	0.81	Agree
4.	Inadequate infrastructure, like reliable internet and computers, to support ITS usage.	3.38	0.79	Agree
5.	Resistance to change among lecturers impedes the adoption of ITS.	2.98	0.68	Agree
6.	Technical complexity of ITS makes it difficult for lecturers to use without expert support.	3.39	0.77	Agree
7.	Lack of institutional policy to promote the use of ITS in teaching.	3.34	0.81	Agree
8.	Limited funding for technological innovations restricts the implementation of ITS in universities.	3.30	0.79	Agree
9.	Absence of collaboration between universities and technology companies limits access to ITS solutions.	3.17	0.84	Agree
10.	Minimize in-person interactions between learners and lecturers which could impede the cultivation of essential communication skills	3.29	0.80	Agree
	Cluster Mean	**3.27**		**Agree**

2, highlight that items 1-10 represent the problems impeding effective incorporation of Intelligent Tutoring Systems (ITS) into business education programmme at public tertiary institutions in Delta State, with mean scores spanning from moderate to high level of agreement (2.98 to 3.45). The standard deviation scores ranging between 0.68 and 0.84 showed that the respondents' opinions were close. Furthermore, the mean of the cluster which is 3.27 indicated that the problems inhibiting the integration of intelligent tutoring system in business education programme in public tertiary institutions in Delta State are limited funding for technological innovations restricts the implementation of ITS in universities and ITS adoption reduces face-to-face interactions between students and lecturers which could hinder the development of critical communication skills among others.

Hypothesis One

There is no significant difference in the opinions of business educators who have experience with intelligent tutoring systems and those without experience in intelligent tutoring systems on the benefits of integrating intelligent tutoring system in business education programme in public tertiary institutions in Delta State.

Table 3: Summary of t-test Analysis on the Benefits of Integrating Intelligent Tutoring Systems in Business Education Programme Based on Experience of Lecturers with Intelligent Tutoring Systems

Variables	N	Mean	SD	df	A	P-value	Decision
Lecturers with Experience with ITS	53	3.50	0.87				
				133	0.05	0.02	Significant
Lecturers without Experience with ITS	82	3.13	0.81				

Result in Table 3 shows that the p-value of 0.02 is less than .05 alpha level of significance. This indicates a significant difference in the opinions of business education lecturers who have experience with intelligent tutoring systems and those without experience in intelligent tutoring systems on the benefits of integrating intelligent tutoring system in business education programme in public tertiary institutions in Delta State. Thus, the hypothesis was not accepted.

Hypothesis Two

There is no significant difference in the opinions of business educators who have experience with intelligent tutoring systems and those without experience in intelligent tutoring systems on the problems inhibiting the integration of intelligent tutoring system in business education programmes in public tertiary institutions in Delta State.

Table 4: Summary of t-test Analysis on the Problems Inhibiting the Integration of Intelligent Tutoring Systems in Business Education Based on Experience of Lecturers with Intelligent Tutoring Systems

Variables	N	Mean	SD	Df	A	P-value	Decision
Lecturers with Experience with ITS	53	3.38	0.82				
				133	0.05	0.34	Significant
Lecturers without Experience with ITS	82	3.23	0.80				

As revealed in Table 4, the p-value of .34 which is more than .05 alpha level, means that the opinions of business educators who have experience with intelligent tutoring systems and those without experience in intelligent tutoring systems on the problems inhibiting the integration of intelligent tutoring system in business education programme in public tertiary institutions in Delta State were not significantly different. Based on this, the hypothesis two was accepted.

Discussion

The study's findings indicate that integrating Intelligent Tutoring Systems (ITS) into business education programme at public tertiary institutions in Delta State yields several benefits, including enhanced student engagement, improved curriculum design, personalized learning, and reduced lecturer workload by automating tasks such as grading. This is in line with the research of Marouf et al. (2024) which found that ITS offers individualized and adaptable learning experiences that cater to individual student requirements, marking a significant departure from traditional teaching approaches. Mosa et al. (2018) noted that ITS aims to assess a learner's ability to comprehend various topics while identifying their strengths and weaknesses, enabling a dynamic adaptation of the learning process to suit individual needs. Nakhal and Bashhar (2017) revealed that the utilization of ITS by lecturers could help improve their pedagogical decisions, facilitating effective assessment of students' needs. Furthermore, the test of hypothesis one showed a significant difference in the opinions of business educators who have experience with intelligent tutoring systems and those without experience in intelligent tutoring systems on the benefits of integrating intelligent tutoring system in business education programme in public tertiary institutions in Delta State. This result agrees with the submission of Gcabashe and Ndlovu (2022) that many educators lack familiarity with advanced educational technologies and this could lead to skepticism about the effectiveness and benefits of ITS.

Again, the findings relating to research question two of the study revealed that the problems inhibiting the effective integration of intelligent tutoring systems into business education programme in public tertiary institutions in Delta State included limited funding for technological innovations restricts the implementation of ITS in universities and ITS adoption reduces face-to-face interactions between students and lecturers which could hinder the development of critical communication skills among others. This corresponds with Alsaqqa et al. (2022), who identified data protection concerns, systemic bias, and demand for frequent up-to-date maintenance as major challenges to integrating ITS in education. Similarly, Ammar (2017) emphasized the importance of addressing concerns of privacy of data, biases in the system as well as the requirement for regular system upgrades. Additionally, Alsharif and Ali (2016) pointed out that the effectiveness of ITS largely depends on the algorithms strength and the level of humanization involved. Regarding hypothesis two, the study found no significant difference in the opinions of business educators who have experience with intelligent tutoring systems and those without experience in intelligent tutoring systems on the problems inhibiting

the integration of intelligent tutoring system into business education programme in public tertiary institutions in Delta State. This finding showed that irrespective of business educators experience with intelligent tutoring system agreed that the problems espoused in the study are the problems inhibiting the integration of intelligent tutoring systems into business education programme in public tertiary institutions in Delta State.

Conclusion

The study which examined the benefits and challenges of integrating Intelligent Tutoring Systems (ITS) into business education programme at public tertiary institutions in Delta State, showed that ITS can significantly enhance business education by improving student engagement, supporting personalized learning tailored to individual needs, facilitating better curriculum design through analysis of student learning patterns and reducing lecturers' workload through automation of routine tasks such as grading. However, the study also reveals key barriers to ITS adoption, including limited funding for technological innovations, which restricts implementation, and reduced face-to-face interactions between students and lecturers, potentially affecting the development of critical communication skills. It is important to address these challenges so as to fully harness the potential of ITS in improving educational outcomes in business education programme at public tertiary institutions.

Recommendations

1.Federal and state governments, in collaboration with tertiary institutions and technology companies should set up an endowment fund that will cater for provision of infrastructural facilities, funding, and expertise to promote the integration of intelligent tutoring systems in public tertiary institutions in Nigeria, particularly business education programme.

2.Administrators of business education programme at tertiary institutions should consistently organize training and capacity-building programmes, such as seminars and workshops, to train lecturers and students on current trends like intelligent tutoring systems for teaching and learning.

References

Ali, T. Q., Ahmed, Y.F.S., & Basma, J.S. (2018). Design and evaluate the effectiveness of the networking tutor: Intelligent tutoring system for teaching students an introduction to computer networks in Iraq. Journal of Scientific and Engineering Research, 5(10), 43-48. https://www.researchgate.net/publication/328676892

Alkhatlan, A., & Kalita, J. (2018). Intelligent tutoring systems: A comprehensive historical survey with recent developments. arXiv preprint arXiv:.09628.

Alrakhawi, H., Jamiat, N., & Abu-Naser, S. S. (2023). Improvement of students' achievement by using intelligent tutoring systems: A bibliometric analysis and reviews. Journal of Theoretical and Applied Information Technology, 101(11), 46-58.

Al-Qadi, M.H., & S.S. Abu-Naser (2024). Using deep learning to classify corn diseases. International Journal of Academic Information Systems Research (IJAISR) 8(4), 81-88.

Alsaqqa, A. H., Alsharif, F., & Ali, M. (2022). Using deep learning to classify different types of vitamin. International Journal of Academic Engineering Research (IJAER), 6(1), 1-6.

Alsharif, F., & Ali, M. (2016). Mechanical reconfigurable microstrip antenna. International Journal of Microwave and Optical Technology, 11(3), 301-313.

Ammar, T. M. (2017). The efficiency extent of the internal control environment in the Palestinian higher educational institutions in Gaza Strip. International Journal of Digital Publication Technology, 1(2), 107-126.

Azuka, E.B. & Nwosu, B.O. (2018). Foundation of business education. Noben Press Limited.

Gcabashe, N. B., & Ndlovu, N. S. (2022). Exploring business studies teachers' technology self-efficacy on their technology integration to create learner-centred teaching environment. International Journal of Learning, Teaching and Educational Research, 21(12), 238-258. https://doi.org/10.26803/ijlter.21.12.13

Marouf, A., Yousef, M. K. A., Mukhaimer, M. N., & Abu-Naser, S. S. (2024). Enhancing education with artificial intelligence: The role of intelligent tutoring systems. International Journal of Engineering and Information Systems (IJEAIS), 8(8), 10-16.

Mosa, M. J., Albatish, I., & Abu-Naser, S. S. (2018). ASP.NET-tutor: Intelligent tutoring system for learning ASP.NET. International Journal of Academic Pedagogical Research, 2(2), 58-72.

Nakhal, M., & Bashhar, B. (2017). Adaptive ITS for learning computer theory. European Academic Research, 4(10), 453-469.

Nwazor, J.C., & Onokpaunu, M.O. (2016). Strategies considered effective for transforming business education programs to the needs of 21st century workplace in Delta State, Nigeria. African Journal of Education and Practice 1(5), 74-82.

Okeke, A. U., & Anagbogu, I. (2023). Strategies for effective teaching of business education in tertiary institutions in Anambra State. NAU Journal of Technology & Vocational Education (NAUJTVE), 8(1), 35-44.

Omar, M.N. & Ismail, S.N. (2021). Empowering teacher self-efficacy in ICT: How does technology leadership play a role? Malaysian Online Journal of Educational Management (MOJEM), 9(3), 1-22.

Onyesom, M. & Igberaharha, C.O. (2021). Inclusive values and pedagogies needed by business studies teachers for effective inclusive education in secondary schools. International Journal of Education and Practice, 9(1), 220-229. https://doi.org/ 10.18488/journal.61.2021.91.220.229