



## **ARTIFICIAL INTELLIGENCE-POWERED SELF-REGULATED LEARNING AND BUSINESS EDUCATION UNDERGRADUATE STUDENTS' ACADEMIC PERFORMANCE IN TERTIARY INSTITUTIONS IN AKWA IBOM STATE, NIGERIA**

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### **Abstract**

*This study investigated the relationship between artificial intelligence-powered self-regulated learning and the academic performance of Business Education undergraduate students in tertiary institutions in Akwa Ibom State. Self-regulated learning strategies studied were self-evaluation and goal setting. The dependent variable is academic performance, measured using students' Grade Point Average (GPA). Two research questions and two null hypotheses were stated to guide the study. The ex-post facto research design was employed for the study. The population of this study comprises 492 Business Education undergraduate students from the 2023/2024 academic year at the two tertiary institutions selected for the study. The purposive sampling technique was employed to select 114 Business Education undergraduate students from the study's population. A researcher-designed instrument titled "AI-Powered Self-Regulated Learning and Business Education Undergraduate Students' Academic Performance Questionnaire" (AIPSRLEUSAPQ) was used for data collection. The instrument was face validated by three experts. The reliability of the instrument was ascertained using the test-retest method, and Cronbach's Alpha was used to determine the reliability of the instrument, yielding a value of .80. Simple linear regression was employed to answer research questions and test the null hypotheses at a .05 level of significance. The study's findings revealed that AI-generated self-evaluation and AI-generated goal setting have weak positive relationships with students' academic performance. The study concludes that students are not engaging in self-directed learning effectively. The study recommends that lecturers should endeavour to utilise instructional techniques that arouse and maintain student interests in classrooms and taught content. This will support self-regulated learning with the aid of Artificial Intelligence.*

**Keywords:** *Artificial Intelligence, Self-Regulated Learning, Business Education, Academic Performance.*

### **Introduction**

Business Education is a programme of study that offers students opportunity to develop skills, abilities and understanding necessary to enter and progress in particular business occupations. It prepares students for job competence, occupational intelligence and work adjustment. It also promotes creativity, self-actualization, and critical thinking, which assists the learners in problem solving and skill acquisition. Tertiary education students' exposure to business skills is to create a pool of men and women of character and competence, people who are balanced in their physical and emotional well-being and who will be effective in the design and implementation of national development programmes.



It is unequivocally clear that institutions of higher learning are engaged in a sustained and continuous process of maximizing the quality of their graduates so as to enhance their readiness for the labour market and further education. Thus, it is important for educational institutions to focus on improving the critical aspects of teaching and learning. One area which has received increasing attention is the learning approaches adopted by students. Research findings have shown that academic performance of university students is related to their learning approach. These studies also revealed that lecturers ought to give necessary considerations to students' learning approaches by planning lectures and students' learning activities as well as gearing instructional methods to how students learn best. So, a positive change in students' performance can also be achieved if lecturers are aware of and recognise students' learning approaches and their academic performance. Consequently, the need to regulate learning in order to cope with the vast requirements of university education and to achieve academic success should be proactively pursued. This could be achieved through Artificial Intelligence-Powered Self-Regulated Learning.

Artificial intelligence (AI) has transformed numerous sectors, including education. Artificial intelligence (AI) has become a pivotal force reshaping traditional business paradigms (Usman *et al.*, 2024). The integration of AI in teaching and learning in business education is becoming more necessary for contemporary pedagogical approaches. This because AI offers customised learning experiences, real-time feedback, and strategic insights which are all vital for aspiring learners. AI is capable of processing and interpreting large, complicated data sets, providing predictive models that aid in the understanding of risk factors, consumer behaviour, and market dynamics by students (Udo and Umoudo, 2024). The analytical power of AI could significantly enhance students' ability to develop more individualised learning abilities as it may accommodate a variety of learning styles and paces by customising instructional content to each student's needs, which will enhance overall educational outcomes (Udo and Umoudo, 2024). Ferguson (2019) stated that personalised learning facilitated by AI can significantly enhance student engagement and retention, which are critical for mastering complex concepts. This because AI offers customised learning experiences, real-time feedback, and strategic insights which are all vital for aspiring learners and can enhance self-regulated learning.

Self-regulated learning is a self-initiated action that involves goal setting and regulating one's efforts to reach a set goal. Jahanshir and Soghra (2011) defined self-regulated learning as the capability of active participation in the learning process from the view point of meta-cognition, motivation and behaviour. Thus, self-regulated learning involves one's ability to understand and control one's learning. It is an awareness of one's own thought processes and an understanding of the patterns behind the thoughts. Self-regulated learning involves constructs such as self-evaluation and goal setting.

Self-evaluation is concerned with evaluating or judging "the worth" of one's performance and in so doing, identifying one's strengths and weaknesses with a view to improving one's learning outcomes. Self-evaluation could be seen as the descriptive and evaluative act carried out by an individual concerning their own work and academic abilities. Panderoet *al.* (2016) posited that self-evaluation is a wide variety of mechanisms and techniques through which students assess and possibly assign merit or worth to the qualities of their own learning processes and products. Students' self-evaluation helps in generating feedbacks that could promote learning and improve students' performance. Students who self-evaluate may be able to make necessary adjustments to learning as they can assess their abilities towards learning a particular concept and then self-motivate towards the attainment of academic success".

A fundamental goal of higher education is to develop students' capacity for life-long learning, which is also one of the United Nation's Sustainable Development Goals (Usoro, 2016).



Student self-evaluation plays a pivotal role in achieving this goal because, from a pedagogical perspective, effective self-regulated or life-long learning is more likely to happen when students have a realistic sense of their own performance so that they can direct their further learning. In this paper, self-evaluation and self-assessment are used interchangeably. The benefits of self-assessment on academic performance may be largely due to its intertwined relationship with self-regulated learning. Self-assessment requires students to judge the quality of their own work against selected criteria, identify the gap between their current and the desired performance standard and take actions to close that gap. Self-assessment facilitates goal setting by identifying personal and environmental resources and helps students search for appropriate learning strategies; it can be used to monitor the learning process, promote self-correction, and guide learning towards the learning goals; and it is also helpful for reflection on the learning outcomes and pointing out direction for future learning.

Goal setting could be seen as a formal program of setting numerical or quantitative performance goals for individuals. Goal setting is necessary in order to identify what one should be doing, how he should be doing it, how long it should take and the things required for its accomplishment. It is important for students to set SMART goals. SMART is an acronym where S stands for specific, M – measurable, A – attainable, R – reliable and T – timely. In addition, such skills and possession of special abilities as determination, interest, self-motivation, hard work, persistence and being focused, all of which are intrinsic to goal setting are likely to be developed, thus leading to improved academic performance.

Goal-setting takes place in an initial phase of self-regulation. Setting a goal involves determining a specific objective that will guide and direct a learner. Karlen (2016) posited that the important features of goal-setting strategy are goal specificity, goal proximity, goal difficulty and self-set goals. Goals are presented in different segments of Self-Regulated Learning. These include forethought (specifying the goal and deciding on the strategies to be employed to attain it), performance control (implementing the goal strategies and monitoring the process) and self-reflection (evaluating the progress and, if necessary, modifying the strategies to be more in tune with the attainment of the goal) (Komarraju and Nadler, 2013). When students set goals, the responsibility for and commitment to their learning rests more on the students, which results in making the students more proactive, empowered and motivated.

Academic performance can be viewed as a students' performance in a school subject as designated by a score or mark obtained in an achievement test. Academic performance represents outcome that indicates the extent to which a person has accomplished specific goals that were the focus of activities or instructional environments, specifically in schools. In this study, academic performance is measured based on students Grade Point Average (GPA). The assessment of students' academic performance as it relates to students' learning could serve as a yardstick to determining whether the objectives of the Business Education programme are being achieved or not. This could be done through the use of achievement test.

### **Statement of the Problem**

The goals of education in Nigeria comprise the development of appropriate skills, mental, physical and social abilities and competencies to empower the individual to live in and contribute positively to the society. Therefore, the teaching-learning process ought to make the most of the potentials and abilities of the individual for self-fulfilment for a successful learning experience. This would imply that individual learners should be able to make constructive and well guided learning strategy towards the attainment of their individual goals especially academic success. Thus, students would have to make more personal efforts toward learning if they must have a significant success in academics. Students have different abilities in learning. Therefore, each student should



have control over their cognition, behaviour, emotions, and motivations through the use of personal strategies to achieve the goals they have established by aligning with or identify modalities or strategies to meet the challenges of diverse learning contents towards the attainment of a high academic performance.

There are many documented evidences indicating that giving attention to individual's learning ability could improve one's academic performance. All students learn, but not all learn in the same way. Some grasp information by listening, while others learn better by reading, reasoning or discovering concepts through a hands-on experience; some learn by being independent while others learn better by depending on teachers, lecturers, and students' group. The belief that learning may impact on learning outcome compelled the researcher to determine whether AI-powered self-regulated learning could have any link with academic performance of Business Education students in tertiary institutions in Akwa Ibom State, Nigeria. This study therefore sought to examine the relationship between AI-self-regulated learning and Business Education undergraduate students' academic performance in tertiary institutions in Akwa Ibom State.

### **Research Questions**

The following questions were formulated to guide the study:

- i. What is the relationship between the application of generative AI tools in self-evaluation and Business Education undergraduate students' academic performance in tertiary institutions in Akwa Ibom State, Nigeria?
- ii. What is the relationship between the application of generative AI tools in goal setting and Business Education undergraduate students' academic performance in tertiary institutions in Akwa Ibom State, Nigeria?

### **Research Hypotheses**

The following null hypotheses were formulated to guide the study and will be tested at 0.05 level of significance:

- Ho<sub>1</sub>: There is no significant relationship between the application of generative AI tools in self-evaluation and Business Education Undergraduate Students' Academic Performance in Tertiary Institutions in Akwa Ibom State, Nigeria.
- Ho<sub>2</sub>: There is no significant relationship between the application of generative AI tools in goal setting and Business Education Undergraduate Students' Academic Performance in Tertiary Institutions in Akwa Ibom State, Nigeria.

### **Methodology**

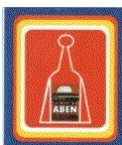
The ex post facto research design was employed for the study. The design was adopted because the study involves drawing generalisations based on analysis of data collected from a fraction of the population. The design in essence, implies that the dependent variables (students' academic performance) have already occurred. The study area is Akwa Ibom State. Akwa Ibom is one of the 36 States that make up the Federal Republic of Nigeria. It shares a common boundary with Abia State to the North, Cross River State to the East, the Bight of Bonny to the South, and Rivers State to the West. The State is situated between latitudes 40°33' and 50°33' North and longitudes 70°35' and 80°25' East. The State has a population of approximately 4 million people and occupies a total landmass of 8,412 square kilometres, with its capital at Uyo (Akpanobong, 2014). The population of this study comprises 492 Business Education undergraduate students from the 2023/2024 academic year at the two tertiary institutions offering a Business Education programme in Akwa Ibom State, Nigeria. The institutions are the University of Uyo and Akwa Ibom State College of Education, AfahaNsit. The reason for using students at this level is that they have



spent at least two years in the programme and would be able to identify the self-regulated learning strategies they have been using. As an affiliate of the University of Uyo, Akwa Ibom State College of Education, AfahaNsit, now award the Bachelor of Science (BSc (Ed)) degree in Business Education of the University of Uyo. Both institutions use the same curriculum content and mode of assessment in their degree programmes, and students' GPAs are rated the same way. The sample size for the study is 114. This study comprises 114 Business Education undergraduate students from the two tertiary institutions used for the study, who were in the 300 Level in the 2023/2024 academic year. These sets of students were purposively sampled because students at this level had taken the general business education courses and had been exposed to the fundamentals of Business Education in their first and second years of study before settling on an area of speciality. Additionally, the students have already spent two academic years in the programme and can be seen to be aware of their strengths and weaknesses in studying. The strategies they have adopted in learning reflect their innate abilities.

A structured questionnaire was used as an instrument. Hasanuddin (2019) stated that assessments for measuring self-regulated learning are based on self-reports. One example of self-report is the questionnaire. Self-assessment instruments, such as surveys or questionnaires, usually consist of a statement followed by a response continuum, including strongly agree, agree, uncertain or unsure, disagree, and strongly disagree. The respondent selects the response that best describes their reaction to the statement. The instrument is titled AI-Powered Self-Regulated Learning and Business Education Undergraduate Students' Academic Performance Questionnaire (SRLBEUSAPQ). The instrument is rated based on the five-point Likert Scale of Strongly Agreed (SA) – 5, Agreed (A) – 4, Undecided (U) - 3, Disagreed (D) – 2, Strongly Disagreed (SD) – 1. Students' Grade Point Average (GPA) was obtained from the Business Education Department of the institutions selected for this study and used as a variable representing students' academic performance. The GPA considered for this study is that of the second semester of the 2023/2024 academic year of the students selected for the study. The choice to use the second-semester GPA was made to ensure that Direct Entry students were considered. Students' Grade Point Average was obtained through a formal application made to the Department of Business Education of the institutions used for this study. The researcher opted for students' GPA because it provides a standardised rating of students' academic performance in universities as contained in the Benchmark of Minimum Academic Standard provided by the National Universities Commission (NUC). The instrument (AIPSRLEUSAPQ) underwent face validation, conducted by three research experts. The expert's comments and inputs were incorporated and used for modification of the final copy of the instrument. The essence of the validation was to ascertain the appropriateness of the instrument for the study.

The instrument was trial-tested to inform the researcher about the reliability of the instrument. The instrument was administered twice to 30 Business Education students in their 400 Level studies in the study area, with a two-week interval between each administration. Cronbach's Alpha was used to determine the reliability of the instruments, yielding a value of .80. The researcher personally administered the questionnaire to the students, assisted by Business Education course lecturers at the selected institutions. Of the 114 questionnaires administered, 107 were properly completed and returned. This represents a 94% rate of return. Students' GPAs were obtained through a formal application to the Head of the Department of Business Education, University of Uyo, and the Directorate of Degree Programmes, Akwa Ibom State College of Education, AfahaNsit. Simple regression was used to answer the research questions and test the null hypotheses at a 0.05 level of significance. The value of  $r$ , beta and R-squared (or coefficient of determination) obtained in the regression model was used to answer the research questions and



to determine the relationship between the independent variable and the dependent variable as follows:

	R value	Interpretation
+/_ 0.81 to 0.99		Very Strong relationship
+/_ 0.61 to 0.80		Strong relationship
+/_ 0.41 to 0.60		Somewhat weak relationship
+/_ 0.21 to 0.40		Weak relationship
+/_ 0.00 to 0.20		Very weak relationship

In testing the null hypothesis, when  $P < .05$ , the null hypothesis is rejected. On the other hand, when  $P \geq .05$ , the null hypothesis is upheld.

**Results**

**Research Question 1:** What is the relationship between self-evaluation and Business Education undergraduate students' academic performance in tertiary institutions in Akwa Ibom State, Nigeria?

**Table 1: Summary of the simple regression test for the relationship between the application of generative AI tools in self-evaluation and Business Education undergraduate students' academic performance**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Coefficient B
1	.158 <sup>a</sup>	.025	.016	.59282	.033

Source: Field Work (2024)

Table 1 presents the summary of the regression test. The result shows that the correlation index is .158, indicating a very weak positive relationship between AI generative tools self-evaluation and Business Education undergraduate students' academic performance. Thus, self-evaluation has a very weak positive relationship with Business Education undergraduate students' academic performance. The coefficient value  $\beta$  is .033, indicating that as self-evaluation increases by one unit, academic performance also increases by .033.

**Research Question 2:** What is the relationship between goal setting and Business Education undergraduate students' academic performance in tertiary institutions in Akwa Ibom State, Nigeria?

**Table 2: Summary of the simple regression test for the relationship between the application of generative AI tools in goal setting and Business Education undergraduate students' academic performance**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Coefficient B
1	.035 <sup>a</sup>	.001	-.008	.59995	.007

Source: Field Work (2024)

Table 2 shows the summary of the regression test. The result shows that the correlation index is .035, indicating a very weak positive relationship between goal setting and Business Education undergraduate students' academic performance. Thus, goal setting has a very weak positive relationship with Business Education undergraduate students' academic performance. The



coefficient value  $\beta$  is .007, indicating that as goal setting rises by a unit, academic performance also rises by .007.

**Testing of Hypotheses:** The following null hypotheses were tested at 0.05 level of significance:

**Hypothesis 1:** There is no significant relationship between self-evaluation and Business Education undergraduate student academic performance in tertiary institutions in Akwa Ibom State, Nigeria.

**Table 3: Summary of Regression Test for significant relationship between application of generative AI tools in self-evaluation and Business Education undergraduate students' academic performance**

Model		Sum of Squares	Df	Mean Square	F	Sig.	Decision
1	Regression	.939	1	.939	2.671	.105 <sup>b</sup>	*
	Residual	36.901	105	.351			
	Total	37.840	106				

\*Not Significant at  $p > .05$ .<sup>105</sup>

Source: Field Work, 2024

Table 3 provides a summary of the regression significance test. The result shows that the calculated F value is 2.671. The probability of F that is the P value is .105. Since the P-value is greater than the alpha level of .05 ( $p > .05$ .<sup>105</sup>), the result is statistically not significant. Hence, the null hypothesis is not rejected. Thus, there is no significant relationship between self-evaluation and the academic performance of Business Education undergraduate students in tertiary institutions in Akwa Ibom State, Nigeria.

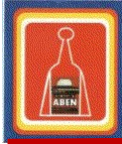
**Hypothesis 2:** There is no significant relationship between goal setting and Business Education undergraduate student academic performance in tertiary institutions in Akwa Ibom State, Nigeria.

**Table 4: Summary of Regression Test for a significant relationship between the application of generative AI tools in goal setting and Business Education undergraduate students' academic performance**

Model		Sum of Squares	Df	Mean Square	F	Sig.	Decision
1	Regression	.046	1	.046	.127	.722 <sup>b</sup>	*
	Residual	37.794	105	.360			
	Total	37.840	106				

\*Not Significant at  $p > .05$ .<sup>722</sup> Source: Field Work, (2024)

Table 4 provides a summary of the regression significance test. The result shows that the calculated F value is 0.127. The probability of F that is the P value is .722. Since the P-value is greater than the alpha level of .05 ( $p > .05$ .<sup>722</sup>), the result is statistically not significant. Hence, the null hypothesis is not rejected. Thus, there is no significant relationship between goal setting and



the academic performance of Business Education undergraduate students in tertiary institutions in Akwa Ibom State, Nigeria.

### **Discussion of Findings**

The findings of this study reveal that the application of generative AI tools in self-evaluation has a weak positive relationship with the academic performance of Business Education undergraduate students. The related hypothesis test shows there is no significant relationship between application of generative AI tools in self-evaluation and Business Education undergraduate students' academic performance in tertiary institutions in Akwa Ibom State, Nigeria. This finding is in variance with Ereh and Orji (2021) who examined self-evaluation and postgraduate students' acquisition of research writing skills in Nigerian universities. It was found out that self-evaluation significantly predicts a positive relationship to postgraduate students' acquisition of research writing skills. This finding also differs from Chien (2012), who investigated the relationship between self-assessment and self-directed learning and student academic performance. The results indicate that there was a significant improvement in performance due to the teaching of self-assessment strategies.

The findings of this study reveal that the application of generative AI tools in goal setting has a weak positive relationship with the academic performance of Business Education undergraduate students. The hypothesis test confirms that there is no significant relationship between the application of generative AI tools in goal setting and the academic performance of Business Education undergraduate students in tertiary institutions in Akwa Ibom State, Nigeria. This finding is supported by Sides and Cuevas (2020), who examined the relationship between goal setting on motivation, self-efficacy, and math achievement in elementary students. The results indicated that elementary students involved in setting goals showed an increase in their mathematical performance of multiplication facts. However, based on the results from this study, goal setting did not have an impact on motivation or self-efficacy. This finding aligns with Adisa and Adis (2019), who investigated the impact of self-regulated learning on the academic performance and satisfaction of students. They found that goal-setting had no significant effect on performance.

### **Conclusion**

Based on the study's findings, it is concluded that there is a positive relationship between self-regulated learning and the academic performance of Business Education undergraduate students in tertiary institutions in Akwa Ibom State, Nigeria. However, the result concludes that self-regulation and goal setting do not have significant effects on performance.

### **Recommendations**

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

- i) Lecturers should endeavour to utilise instructional techniques that arouse and maintain student interests in AI in classrooms and taught content. This will support AI-powered self-regulated learning.
- ii) Lecturers should provide prompt feedback to students on the assessment. This will help spur self-evaluation in students.

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