

## AN ASSESSMENT OF SUDOKU PROFICIENCIES FOR SPREADSHEETS APPLICATIONS AMONG BUSINESS EDUCATION STUDENTS IN FEDERAL UNIVERSITIES IN SOUTH-SOUTH NIGERIA

ABASIENIE SAMPSON BASSEY<sup>1\*</sup>, ANTHONY UGWU OBAYI<sup>2</sup>, CHARLES NDUKWU  
AGBAEGBU

<sup>1</sup>DEPARTMENT OF BUSINESS EDUCATION, UNIVERSITY OF UYO, UYO

<sup>2</sup>DEPARTMENT OF ENTREPRENEURIAL DEVELOPMENT, MICHAEL OKPARA UNIVERSITY OF AGRICULTURE, UMUDIKE

<sup>3</sup>DEPARTMENT OF SCIENCE EDUCATION, MICHAEL OKPARA UNIVERSITY OF AGRICULTURE, UMUDIKE

\*Corresponding email: abasieniesbassey@uniuyo.edu.ng

**To cite this article (APA):** Bassey, A. S., Obayi, A. U., & Agbaegbu, C. N. (2024). An assessment of Sudoku proficiencies for spreadsheets applications among business education students in Federal Universities in South-South Nigeria. *AAU Journal of Business Educators*, 4(2), 182-188

### Abstract

The purpose of this study was to assess the level of Sudoku Proficiency for spreadsheets applications among Business Education students in Federal Universities in South-South Nigeria. Two research questions were raised to guide the study. A descriptive survey research design was used to achieve the central aim of the study. The population of the study consisted of 1063 Business Education students in Federal Universities in South-South Nigeria. A proportionate sampling method was used to select 291 Business Education students as respondents for the study. A structured questionnaire titled, "Sudoku Proficiency for Spreadsheets Applications among Business Education Students Questionnaire (SPSBEQ)" was used for data collection. The instrument was face validated by three research experts, two in Business Education and one in Measurements and Evaluation. Cronbach's alpha was used to determine the internal consistencies of the items in the instrument, which yielded the reliability coefficient value of .805. The mean statistic was used to answer the research questions. The results revealed that Business Education students possesses Sudoku proficiencies such as critical thinking and numerical proficiency for spreadsheets applications in South-South Nigeria to a great extent. It was recommended, among others, that curriculum designers and policy makers should endeavour to integrate Sudoku as a course into the Business Education curriculum in order to help achieve the goals of business education programme in Nigeria.

**Keywords:** Business Education Programme, Business Education Students, Critical Thinking Proficiency, Numerical Proficiency, Sudoku Proficiency, Spreadsheets Applications

### Introduction

Spreadsheets Applications is an undergraduate course that is offered to students of Business Education, and other allied disciplines. According to Fahad (2024), the course is intended to introduce the basics, principles and rudiments of spreadsheets operations to Business Education students in order to keep them abreast with the requirements of the office technology and management in the world of work. In a study conducted by Ido and Bassey (2015), students having issues with complications arising from spreadsheets applications can try to solving Sudoku games, which are oftentimes available online or offline in their smart phones.

According to Bassey, Udo and Obayi (2024), spreadsheet itself is an interactive computer application for organization analysis and storage or data in a tabular form. Spreadsheets were

developed as computerized analogs of paper accounting worksheets. The program can be operated through data entering in cells of a table. Each cell may contain either numeric or text data, or the results of formula that automatically calculate and display a value based on the content of other cells. Spreadsheets may also refer to one such electronic document. A spreadsheet consists of a table of cells arranged into rows and columns and referred to by X and Y location, the columns are normally represented by letters A, B, C etcetera. while rows are normally represented by numbers 1, 2, 3 etcetera. A single cell can be referred to by addressing its rows and columns, C10 for instance. There seem to be a great relationship between Sudoku games and spreadsheet. This is because both of them deal with rows and columns. Therefore, Sudoku games skill can be applied in spreadsheet operations in order to enable the learner (for example, Business Education students) learn effectively. According to Ido and Bassey (2016), besides performing basic arithmetic and mathematical functions, modern spreadsheets provide build-in functions for common financial and statistical operations such as net present value. Sudoku game to David et al., (2020), can also be called the number game, which the authors defined as a logic based combinatorial number placement puzzle. The objectives of Sudoku games are to fill a 9 x 9 grids with digits so that each column, each row and each of the nine 3 x 3 subgrids that compose the grid contain all of the digits for 1 to 9.

According to Gennman et al., (2024), Sudoku is a puzzle in which missing numbers are to be filled into a 9 by 9 grid of squares which are subdivided into 3 by 3 boxes so that every row, every column and every box contain the numbers 1 to 9. Magdalena and Sylwia (2024) remarked that Sudoku skills are logic based combination puzzles which are popular among people of different ages and classes. Sudoku has been subject to many research studies, particularly its mathematical and algorithmic properties. There are several proficiencies from sudoku that can be impacted on Business Education students for Spreadsheet Applications. These include critical thinking and numerical efficiency proficiencies. Critical thinking is usually associated with Sudoku. Scholars like Manuel and Immacuda (2023) have come to appreciate the critical thinking skills associated with Sudoku. Unlike logical thinking, Gennmann (2024) opined that critical thinking is generally known as the science of correct thinking. Critical thinking is very essential in decision making and problem solving. There are two types of critical thinking process which are inductive and deductive critical reasoning. Deductive reasoning, which involves the reasoning process that derives a conclusion from a set of accepted premises which is generally applicable to what is done when students play Sudoku. Bassey, Udo and Obayi (2024) pointed out that;

“When playing Sudoku, we are actually examining the existing numbers in the 9 x 9 grid and trying to come up with a conclusion on what value to be filled in for an unsolved cell with constraints of the game rule that there should be no duplicate numbers in each row, each column or each 3 x 3 sub-grid. To put it in a logical deduction way, we can say that the premises we have here is the existing numbers in the grid and the game rule. The conclusion to reach is what values an unsolved all should hold, so Sudoku solving process is in fact a series of logical deductions.” P. (6).

Researchers and scholars have found out that critical thinking ability can be improved by experience as well as examples and instructions as long as people are conscious of the fact that they are using logical procedures (Pantelis & Nikolaus,2023). Sudoku games can often times makes students face numerical problems squarely. Ido and Bassey (2016) remarked that since Sudoku games involves numerals or values, its application usually allays the fears of students especially female Business Education students who are often times afraid of figures. Some male students can combat mathematically related to the issue of Spreadsheets Applications without fear. When the fear associated with numbers is allayed, the student becomes efficient in numerical efficiency skills (Serena, 2024). Numerical efficiency skills according to Pantelis and Nikolaus (2023) is the skill that involves a student being able to manipulate values without any form of prejudice. Some scholars like David et al., and Saket (2023) refer to this skill as manipulative skills. Manipulative skills refer to

simple the process of being able to manipulate figures to arrive at a certain solution. Students with this skill can easily construct word problems to mathematical equations. Ido and Bassey (2017) opined that numerical efficiency skill usually enabled Business Education students to contextualize Spreadsheet operation problems to real life situation which they can easily understand for solving sake. Scholars like Tay (2024) and Sacket (2023), have opined that Sudoku is not a mathematical game, but it has capabilities of making students develop numerical efficacy. Cases abound where students who think they have phobia for figures, usually solve problems relating to figures squarely after completing a Sudoku task (Tay,2024).

It is disheartening to observe that the academic performance of Business Education students in Spreadsheet Application is usually poor. Students of Business Education often times are scared of figures and numbers. Most of these students lack the necessary skills to use in solving Spreadsheet Application problems leading to their poor academic performance. It is often discouraging to observe that most Business Education students do not possess the requisite skills to concentrate on their studies that would enable them pass spreadsheet application in excellent grade. Most of the students do not even have personal time tables for study; couple with poor cognition for problem solving, critical and logical reasoning to encounter spreadsheet Application problems. Furthermore, a search through Journals, texts, publication and online reading materials revealed that none of the publication deals with Sudoku skills as a precursor for Spreadsheet Applications among Business Education students in Federal Universities in South-South Nigeria. It was against this backdrop that this research assesses Sudoku skills as precursors for Spreadsheet Applications among Business Education students in Federal Universities in South-South Nigeria was carried out to.

### **Purpose of the Study**

The central purpose of this study was to assess Sudoku skills for Spreadsheets Applications among Business Education students in Federal Universities in South-South Nigeria. Specifically, the study sought to assess:

1. the level of critical thinking proficiency for Spreadsheets Applications among Business Education students in Federal Universities in South-South Nigeria.
2. the level of numerical proficiency for Spreadsheets Applications among Business Education students in Federal Universities in South-South Nigeria.

### **Research Questions**

The following research questions guided the study.

*Research Question 1:* What is the level of critical thinking proficiency for Spreadsheets Applications among Business Education students in Federal Universities in South-South Nigeria?

*Research Question 2:* What is the level of numerical proficiency for Spreadsheets Applications among Business Education students in Federal Universities in South-South Nigeria?

### **Methods**

#### ***Research Design***

A descriptive survey research design was used for this study. The design was appropriate because the researcher was interested in describing the inherent characteristics of the group through a survey questionnaire. According to Fahad (2024), a descriptive design is a kind of research design that is aimed at systematically obtaining data and information to help describe a phenomenon, event or population as the case may be. It is a design that helps to answer the “what”, “when”, “where” and “how” questions regarding the research question rather than the “why”. A descriptive research design is important to this study because the researcher was interested in understanding and investigating the research problems and the reason for its existence in the first place.

### ***Population and Sampling Procedure***

The population for this study consisted of 1063 Business Education students in Federal Universities in South-South Nigeria. The reason for using Business Education students' is because different universities are currently offering spreadsheet applications in Business Education based on their peculiarities. A proportionate sampling method was used to select the respondents for the study. To get a representative sample, the Taro Yameni's Formula was used to calculate the sample size, where:

$$N \frac{1+n(e)^2}{1+0.052(1063)} = 291$$

**Table 1: Population and Sample Distribution.**

S/N	Universities	Populations	Percentages	Samples
1.	University of Uyo, Uyo	360	33.8	98
2.	University of Calabar, Calabar	258	24.27	71
3.	University of Benin, Benin	309	29.07	85
4.	Federal University, Otuoke	103	9.69	28
5.	University of Portharcourt, Rivers	33	3.1	9
	TOTAL	1063	100%	291

### ***Data Collection Instrument***

A structured questionnaire, titled: "Sudoku Proficiency for Spreadsheets Applications among Business Education Students Questionnaire (SPSBEQ)" was used for data collection in the study. The questionnaire was subdivided into section 1, which deals with problem critical thinking proficiency and section 2 which deals with numerical proficiency. The opinion of the subjects will be determined while using the rating scale of VGE = Very Great Extent with 5 points, GE = Great Extent with 4 points, LE = Low Extent with 3 points, VLE = Very Low Extent with 2 points, NE = No Extent with 1 point.

### ***Validation and Reliability of the Instrument***

The instrument was validated by three experts, two in Business Education and one in Measurement and Evaluation. They were giving initial draft of instrument for the determination of its comprehensiveness, relevance of contents; appropriateness of directives, clarity of statement, ambiguity, possible errors as well as omissions. The instrument contained a total of 10 questionnaire items. All the advice, comments, suggestions and criticisms were incorporated in the final draft of the instrument. The instrument was further subjected to a reliability test using an estimate of internal consistency developed by Cronbach's in 1970. To achieve this, copies of the instrument were administered on 15 Business Education students' in University of Nigeria, Nsukka and were also administered on 15 Business Education students' in Alex Ekwueme Federal University, Ndifo-Alikwo, totaling 30 students. This group was not used for data collection of the present study. The reliability index yielded a co-efficient value of .805.

### ***Data Collection Procedure***

Data was collected through the help of five research assistants who were briefed on the procedures pertaining to the administration of the questionnaire on the respondents. The authors and research assistants covered University of Uyo, University of Calabar, Universities of Port Harcourt, and University of Benin.

### Data Analysis

The data collected from the respondents was analyzed using the mean statistic. The mean was used to answer the research questions. The decision rule for the research questions was based on any calculate mean equal to, or greater than 2.50 means that Business Education students agreed to a very high extent with the questionnaire items raised, while any calculated mean less than 2.50 means that Business Education students disagreed to a very low extent with the questionnaire items raised.

### Results

*Research Question 1:* What is the level of critical thinking proficiency for Spreadsheets Applications among Business Education students in Federal Universities in South-South Nigeria?

**Table 2: Mean ratings on the level of critical thinking proficiency for Spreadsheets Applications among Business Education students in Federal Universities in South-South Nigeria.**

S/N	Items	Mean	Remark
1.	Deducting inference from mathematical models	3.81.	High extent
2.	Detailed identification skills	4.02.	High extent
3.	Reflective thinking skills	4.01.	High extent
4.	Independent thinking skills	4.21.	High extent
5.	Rational thinking skills	3.81.	High extent
	Cluster mean	3.97.	High extent

From the data analysis on Table 2, all the items show that all the items surpassed the cut-off point of 3.0 indicating that the impact of critical thinking proficiency on students in Spreadsheet Application is to a great extent with a cluster mean of 3.97.

*Research Question 2:* What is the level of numerical proficiency for Spreadsheets Applications among Business Education students in Federal Universities in South-South Nigeria?

**Table 3: Mean ratings on the level of numerical proficiency for Spreadsheets Applications among Business Education students in Federal Universities in South-South Nigeria.**

S/N	Items	Mean	Remark
1.	Improving efficiency in numbers usages	3.81	High extent
2.	Improving computational efficiency	4.11	High Extent
3.	Engaging mathematics problems	3.63	High extent
4.	Improve number knowledge	3.16	High extent
5.	Nonverbal communication skills	4.36	High extent
6.	Improving upon number computation skills	3.85	High extent
	Cluster mean	3.8	High extent

Data analysis on Table 3 has shown a mean of 3.8 wish a high extent. This indicates that numerical proficiency on students' in spreadsheet application in Federal Universities, South-South, Nigeria to a great extent.

### Discussion

The results of the data analysis on Table 2 had shown that Business Education students possesses critical thinking proficiency for Spreadsheets Applications among Business Education



students in Federal Universities in South-South Nigeria to a great extent. It further showed that students who have commercial background perceived the impacts of critical thinking proficiency more than their counterparts from non-commercial background secondary schools. This finding is in consonance with the findings of Ido and Bassey (2016) who opined that students from a commercial background will apply more and advanced critical thinking skill needs than those from the grammar school when solving spreadsheet application problems.

The results of the data analysis on Table 3 had shown that Business Education students possesses numerical proficiency for Spreadsheets Applications among Business Education students in Federal Universities in South-South Nigeria to a great extent. It also showed that gender caused significant difference in their mean rating on their perception of the impacts of numerical efficacy skill on students' academic performance in spreadsheet application. This finding is supported by the findings of Ido and Bassey (2015) who opined that gender has an impacts on students' academic performance. He also opined that male gender strives in manipulative skill while the female gender strives on literary skills.

### Conclusion

Based on the data analysis carried out in this study and the findings obtained from the study, the following conclusion was drawn. Sudoku skills are acquired by Business Education students in spreadsheet application in federal universities in South South Nigeria to a great extent. Critical thinking skill is acquired by Business Education students in spreadsheet applications. It was concluded that numerical efficiency proficiency is acquired by Business Education students to a great extent.

### Recommendations

Based on the research findings, the following recommendations were made:

1. Curriculum planners and policies makers should as a matter of urgency, introduce Sudoku games as a general study course for students to study, play and learn the requisite skills for boosting their academic performance.
2. Students of Business education should as a matter of necessity draw up and follow on their personal study time in order to help boost their academic performance.
3. Business education lecturers should always utilize innovative teaching techniques and method when teaching courses that are loaded with complex and simple calculus to make the lesson interesting to the students.
4. The federal government should improve funding of Business Education programmes to enable each department of Business education to be fully equipped with modern day computer systems to help demystify the challenges of computer associated courses.
5. Parents should help provide better handsets with Sudoku games to their wards to help them develop the accompanying skills inherent in such games

### References

- Bassey, A. S., Udo, D. D., & Obayi, A. U. (2024) Assessment of Sudoku skills acquired by Business Education students in federal universities in South South Nigeria. *AAU Journal of Business Education*, 4(1), 366-359.
- David, M. C, Martina S., Wolfgang, S., Wolfgang, W., & Armin, B. (2020). Computational logic in the first semester of Computer Science: An experience report. *Knowledge Review*, 3(2) 374-320.
- Fahad, S. (2024). The flipped classroom approach: A review of cognitive styles and academic performances. *Currie*, 16(1). 76-56.
- Gennman, D., Li Zhang, Endale, T., Sabika K., Congyu D., Wang Tian, Chunhai, G. (2024). Effect of out-of-school visual art activities on academic performance. The mediating role of socioeconomic status. *Journal of Private Education*, 19(2). 60-45.

- Ido, C. F., & Bassey, A.S. (2015). Challenges of business education in achieving employment efficiency. *Journal of Qualitative Education*, 2(1), 56-61.
- Ido, C. F., & Bassey, A.S. (2016). Improving business education contents; a prerequisite for achieving economic recovery in Nigeria's post oil era. *Knowledge Review*, 34(1). 256-249.
- Ido, C.F., & Bassey, A.S. (2016) TVET partnership and profitability of small scale business in Akwa Ibom state: A panacea for economic growth. *Journal of Association of Vocational and Technical Educators in Nigeria*, 21(2). 55-47
- Magdalena, S., & Sylwia N. (2024). Retrieval practice in foreign language pedagogy. *Olive*, 43(1), 159-143.
- Manuel O. R., & Inmaculada, R. B. (2023). Interrelation of the psychomotor system and the cognitive relational process on academic performance in people with autism spectrum disorder. *International Journal of Research*, 5(3), 10-27.
- Serena, L. (2024). Dealing with trauma and threats in a school setting is a tough but necessary conversation to have. *Journal of Educational Research*, 13(3), 55-45.
- Pantelis S and Nikolaos, A. (2022). ECIE 2022 17th European conference on innovation and entrepreneurship, Academic Conferences and publishing limited. Retrieved from [https://play.google.com/store/books/details?id=HNOYEAAAQBAJ&source=gbs\\_api](https://play.google.com/store/books/details?id=HNOYEAAAQBAJ&source=gbs_api)
- Saket S. (2023). Chess and the human brain-demystifying the therapeutic value of a board game. *Journal of High School Science*. 7(3). 32-18.
- Tay, E. G. (2024). I am afraid of technology: Some tips to overcome the fear of coding. *The Mathematician*, 5(1) 15-3.