

ASSESSMENT OF SODUKU SKILLS ACQUIRED BY BUSINESS EDUCATION STUDENTS' IN FEDERAL UNIVERSITIES IN SOUTH-SOUTH, NIGERIA

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Abstract

The purpose of this study was to determine the extent to which Sudoku Skills are acquired by Business Education Students in Federal Universities in South-South Nigeria. A descriptive survey design was used to achieve the purpose of the study. The population of the study consisted of 1063 Business Education students in federal universities in South South Nigeria. A proportionate sampling technique were used to select 291 Business Education students as participants for the study. A structured questionnaire, titled: "Sudoku Skills Acquired by Business Education Students (SSABES)" was used for the collection of data in the study. The instrument was face validated by three research experts, two in Business Education from University of Uyo, Uyo, Akwa Ibom State and one in Measurements and Evaluation from Michael Okpara University of Agriculture, Umudike, Abia State. Cronbach's alpha was used to determine the internal consistency with an overall coefficient value of .805. Mean and standard deviation were used to answer the research questions. It was discovered, among others, that Sudoku skills of problem solving and time management was acquired by Business Education Students to a great extent. It was recommended, among others, that curriculum planners and policies makers should endeavour to introduce Sudoku as a course in Business Education as this will help to boost students' academic performance.

Introduction

Spreadsheet applications is an undergraduate course that is offered to students of Business Education, and other allied disciplines. According to Ainola (2014), the course is intended to introduce the basics, principles and rudiments of spreadsheet operations to beginning Business Education students to keep them abreast with the requirements of the office employment. In a pilot study conducted by Ido and Basse (2015), students having issues with complications arising from Spreadsheet Applications can try solving Sudoku games which are oftentimes available online or offline in their smart phones. According to Bryan (2015), spreadsheet 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 operates data entered 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. A spreadsheet 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 etc. while rows are

normally represented by numbers 1, 2, 3 etc. A single cell can be referred to by addressing its rows and columns, C10 for instance. There is 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 learn effectively. 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 according to Okoro (2018) can also be called the number game, which is defined as a logic based combinatorial number placement puzzle. The objective is to fill a 9 x 9 grids with digits so that each column, each row and each of the nine 3 x 3 sub-grids that compose the grid contain all of the digits for 1 to 9.

According to Ben (2013), 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. Kazeem and Fatemi (2017) remarked that Sudoku is a logic based combination puzzle which is popular among people of different ages and classes. Sudoku has been subject to many research studies, particularly to its mathematical and algorithmic properties (Pelaneth, 2011). Examples include enumerating possible Sudoku grid (Felgenheuer & Javis, 2017), use of constraint propagation or generate algorithms (Mantere & Kolgoren, 2017) and solving the puzzle or algorithms for generating puzzles (Fowler, 2019).

Recently, psychological aspects of the puzzle have been studied (Henz & Troung, 2019). In recent years, the study of Sudoku on human learning has been on the forefront because the Sudoku puzzle has very simple rules which make it amenable to analysis. Okagbue Adamu, Opanuga, Omogbadegun and Obasi (2015), Opine that Sudoku is a game and one of the objectives of game is to improve the cognitive ability and logical thinking ability of human. Unlike popular opinion, Sudoku game does not require any knowledge of mathematics, all it requires is the brain and readiness. Ido and Bassey (2017) discovered some skills that can be transferred by Sudoku to Business Education students to enable them learn and master Spreadsheet Application effectively. The Sudoku skills are the problem solving skills, logical reasoning skills, critical thinking skills, time management skills, numerical efficacy skills, balancing skill and process concentration skills.

The first skill that is closely associated with Sudoku is the problem solving skill. According to Kurbal (2015), the concept of a problem is defined differently in related literature. A problem comes to mean a situation which attracts problem solver's interest, possess problem solver's mind and directs problem solver to search to reach the solution of problem. Kurbal (2015) defined a problem as an issue which solution is not known at the beginning. For an issue to be classified to as a problem, it must cause the problem solver some difficulty at the start of trying to find solution to the problem. Barki (2016) opined that problems usually disturb the problem solver's balance of cognitive system.

Spreadsheet Applications problems are basically related to mathematical problems because both requires operation that follows systematic process of finding or providing solutions, as such, Spreadsheet Applications problem just like mathematical problems can be categorized into routine and non-routine problems (Arslan & Altun, 2017). Routine problems are solved by following a generally laid down principles that are generally accepted while non- routine problems are solved by using different combination of principles, methods and strategies and this usually forced problem solvers to think in different ways (Inue, 2015).

Sudoku itself is a game that requires an individual solving the problem by fixing the missing values of a specified required time. In Sudoku, the non-routine problems require a combination of techniques and strategies. Non-routine problems require some cognitive skills such as identifying the relationship between given data in problems, analyzing and synthesizing them and some operational skills. According to Kurbal (2015), the process of solving problem such as producing different ideas

on applying significant methods are more important than achieving the correct solutions in non-routine problems. Problem solving skill according to Ido and Bassey (2017) is a skill that helps the individual to determine the source of a problem and find an effective solution. Although problem solving is often identified as its own separate skills, there are other related skills that contribute to this ability. Some of the problem solving skills includes active listening, analysis, research, creativity, communication, dependability, decision-making and team building.

Time management skill according to Usoh (2014) is seen as the skill that deals with the planning, directing and controlling of time spent on an individual task in order to fully actualize the task. Time Management skill is a core requirement when solving both Spreadsheet issues and Sudoku. Sudoku puzzle on its own is a time-based game that gives the individual puzzle to be fulfilled in a particular time frame. Time management according to Job (2013), is critical for task accomplishments. It involves conditioning oneself to meet up a particular target. Weidman (2017) observed the fact that Sudoku skill is one of the most popular puzzle games in the world and that most of the people that do it, do not avoid contraction.

Time management skill according to James (2019) includes variety of skills that will help an individual manage his/her time effectively. It includes the orientation, prioritization, setting goals, communication, planning delegative and stress management. Time management should be important because they help individual to structure their work in a way that allows the individual to accomplish goals. Setting aside specific amounts of time per day definitely help individuals to complete the necessary steps to getting a task done. Time management according to Okoro (2010) helps a student to have space to be creative and proactive with their goals. When students have specific time set aside to complete their Spreadsheet Application tasks, they can also allow for time to think out critically in order to minimize the amount of errors that might be inherent in a task.

Sudoku puzzle has its time limits that students are allowed to complete at a particular time and scores are often awarded for completing under the stipulated time frame. Students who have completed that task under a specified period could be said to be competent and such competency can be applied to spreadsheet operations problems. Students can effectively make use of their time if they usually apply the critical thinking skill in solving the Sudoku puzzle. Time is a great factor in solving Spreadsheet operations problems. In answering questions with regards to Spreadsheet operations, students are often presented with problems that require brainstorming within the limited time, especially when the expected formula is given for one to fill in the rows and columns. Most job interviewers focus on time management skill than other skills because an individual with efficient time management skill can complete a given task even under pressure. The importance of time management can be emphasized in timely completion of task.

Statements of the Problem

Spreadsheet application is a course that has its foundation in computer studies at the secondary school level. The student is exposed to the rudiment of computing, Spreadsheet Application, and practical experiences. It is believed that any student wishing to study Business Education is expected to acquire background knowledge of computing at the early stages. Then the transfer of knowledge from the early stage computing to the university Spreadsheet Application becomes a smooth transition. 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 examined the level of acquisition of Sudoku skills among Business Education students' in Federal Universities in south-south Nigeria, which provided opportunity for the authors to embark on the present study.

Purpose of the Study

The purpose of this study was to determine the extent of Sudoku skills acquired by Business Education students' in Federal Universities in South-South, Nigeria. Specifically, the study sought to determine:

1. the extent to which problem solving skill is acquired by Business Education students' in Federal Universities in South-South, Nigeria.
2. the extent to which time management skill is acquired by Business Education students' in Federal Universities in South-South, Nigeria.

Research Question

The following research questions guided the study.

Research Question 1: To what extent does problem solving skills is acquired by Business Education students' in Federal Universities in South-South, Nigeria?

Research Question 2: To what extent does time management skills is acquired by Business Education students' in Federal Universities in South-South, Nigeria?

Method

Research Design

A descriptive survey 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 William (2019), the 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". The descriptive 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 sample size of 291 Business Education Students was selected for the study. A proportionate simple random sampling technique was used to select the respondents for the study. Taro Yameni Formula was used to calculate the sample size.

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

Data Collection Instrument

A structured instrument, titled: “Sudoku Skills Acquired by Business Education Students (SSABES)” was used for the collection of data in the study. The questionnaire was subdivided into section 1 which deals with problem solving skills and section 2 which deals with time management skills. The opinion of the subjects will be determined while using the rating scale of VGE representing Very Great Extent with 5 points, GE representing Great Extent with 4 points, LE representing Low Extent with 3 points, VLE representing Very Low Extent with 2 points, NE representing No Extent with 1 point.

Instrument Validation and Reliability

The instrument was validated by three experts, two in Business Education from University of Uyo, Akwa Ibom State and one in Measurement and Evaluation from Michael Okpara University of Agriculture, Umudike MOUAU, Abia State. 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 70 questionnaire items. All the advice, comments, suggestions and criticisms were incorporated in the final instrument.

The instrument was subjected to reliability test using an estimate of internal consistency developed by Cronbach 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. This group was not used for data collection of the present study. The reliability index yielded the overall reliability co-efficient value of .805.

Data Collection Procedure

Data was collected from the students through the administration of a structured questionnaire by the authors. The authors were assisted by five (5) research assistants who were duly briefed in the administration of the questionnaire. The authors and their research assistants covered University of Uyo, University of Calabar and Universities of Port Harcourt and University of Benin.

Data Analysis

Data collected from the respondents was analyzed using mean and standard deviation. The mean was used to answer the research questions and standard deviation were used to determine the extent to which the responses of Business Education students were clustered around or deviated from the mean. 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. Any standard deviations value between 0.00 and 0.96 shows that Business Education student’s responses are very close, meaning that their responses are clustered around the mean.

Results

Research Question 1: To what extent does problem solving skills is acquired by Business Education Students’ in Federal Universities in South-South, Nigeria?

Table 1: Mean and Standard Deviation Rating of Sudoku Skills of Solving Acquired by Business Education Students’ in Federal Universities in South-South, Nigeria.

S/N	Statements	M	SD	Remarks
	To what extent does:			
1	worded mathematical issues in Spreadsheet application boost Students academic performance.	4.18	1.83	GE
2	difficult problems involving Corel drawing in Spreadsheets Enhances students' academic performance.	4.33	1.71	GE
3	complex issues in spreadsheets’ application enhance students’ academic performance.	4.73	2.10	VGE
4	actively anticipating future Spreadsheet problem would boost academic performance.	4.28	1.53	GE
5	lateral mindsets in spreadsheets’ application enhances students’ academic performance.	4.10	1.63	GE
6	intelligent solutions to problems aid academic performance	3.89	2.11	GE
7	developing block column and row in Spreadsheet application boost students' academic performance.	4.01	1.44	GE
8	analyzing spreadsheet application enhances students' academic performance.	4.36	1.73	GE
9	team building in spreadsheet application enhances students' academic performance.	3.77	2.16	GE
10	effective communication aids students' academic performance In spreadsheet application.	4.39	1.28	GE
	Grand Mean	4.20	1.75	GE

From the data analysis on Table 1, it can be seen that all the items surpassed the cut- off point of 3.0. The item with the highest mean score is item 3, which states inter alia “complex issues in spreadsheet application through Sudoku skills. With a mean rating of 4.73. The item with the lowest mean score is item is item 9 which states inter alia “Team building in spreadsheet application with a mean score of 3.77. The grand mean of 4.20 indicates that problem solving skill is acquired by Business Education students in spreadsheet application to a great extent.

Research Question 2: To what extent does time management skills is acquired by Business Education Students’ in Federal Universities in South-South, Nigeria?

Table 2: Mean and Standard Deviation Rating of Sudoku Skills of Time Management by Business Education Students’ in Federal Universities in South-South, Nigeria.

S/N	Statements	M	SD	Remarks
	To what extent does:			
1	organizing an effective study time table boosts academic performance In spreadsheet applications.	3.89	1.73	GE
2	submitting assignments on time aid academic performance of students" In spreadsheet applications.	3.91	2.01	GE
3	prioritizing which aspects of the curriculum to work harder in order to Boost Academic performance.	4.03	1.88	GE
4	goal setting in achieving efficiency promotes academic performance of Students' in spreadsheet application	4.13	1.63	GE
5	delegating tasks to classmates to save time helps to boost academic Performances in spreadsheet applications.	3.68	1.72	GE

6	effectively managing stress improves academic performance of students' In spreadsheet applications.	4.23	1.64	GE
7	managing the calendar to be in sync with purpose help achieve academic Performances.	4.13	1.71	GE
8	understanding the importance is time management as a key to achieving Academic performances.	4.37	2.18	GE
9	setting aside some hours for studying difficult problems help boost Academic performances,	4.28	1.60	GE
10	understanding the role of time in enhancing academic performances.	3.52	1.11	GE
	Grand Mean	4.02	1.72	GE

From the data analysis on Table 2, it can be seen that all the items surpassed the cut-off point of 3.00 The item with the highest mean rating is item 8 with a mean of 4.37 while the item with the lowest mean rating is item 10 with a mean rating of 3.52. The grand mean of 4.02 indicated that time management skill is acquired by Business Education students in spreadsheet applications to a great extent.

Discussion

Tables 1 showed that problem solving skill is acquired by Business Education students in spreadsheet application in federal universities in South South Nigeria. It also indicates that age is a core variable that affects the perception of students on the extent problem solving can be acquired by Business Education students. This finding corroborated with the findings of Ido and Bassey (2015) who opined that age as a chronological factor help students to appreciate and understand complex factors in spreadsheet application thereby making them to problem solving skills. Nonetheless, the findings do not agree totally with Inue (2015) who opined that age has minimal relationship with intelligence. The findings of Weidman (2017) opined that problem solving skill is acquired by Business Education students in spreadsheet applications.

Tables 2 showed that time management skill is acquired by Business Education students' in spreadsheet application in federal universities in South South Nigeria. This study had also shown that gender is an important factor and attribute that influences Business Education students perception of time management as acquired by Business Education students in spreadsheet applications. This finding agree with the assertion of James (2017) who opined that the gender stereotypes usually create an imposed and hereditary consciousness that tends to make the male gender to be more time conscious than their female counterparts. The findings of Bryan (2015) that female are scared of figures usually corroborate with the findings which means male students are more involved in courses that requires complex calculations. The finding agrees with the finding of Kurbal (2015) who found that time management skill can be acquired by Business Education students in spreadsheet applications.

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 is acquired by Business Education students in spreadsheet application in federal universities in South South Nigeria to a great extent. Problems solving skill is acquired by Business Education students in spreadsheet applications. It was concluded that time management 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 forbid sting 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.

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