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The Effects of Computer Aided Instruction in Caribbean Studies on the Academic Performance of Students in the Lower Sixth Form at President's College

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ABSTRACT: - *This study was carried out at a senior secondary school in Guyana to investigate the effects of computer Aided Learning on the academic performance of students in the Lower Sixth Form and was conducted in the Easter term of academic year 2017/2018 with the same lecturer delivering both approaches to the two groups. The classes were divided equally as experimental and control groups with a total of 38 students. Prior to the study, both groups were given an achievement test and a scale of attitude towardscomputer. In the experimental group, computer-assisted instruction prepared for this purpose were carried out, while in the control group, the lesson was covered through traditional lecture method. A simple random sample was used as the method for data collection. This research design was used because it was the most appropriate, given the school setting. In the analysis of data, percentage, frequency, arithmetical mean, standard deviation and t test were used. The significance level was adopted at (p ≤0.05) thrust level in the study. The findings indicated a significant difference in the performance of students in Caribbean Studies using computer aided instruction when compared to those students who were taught using the lecture method.*

Key Words: *Academic Performance, Caribbean Studies, Computer-Aided Instruction, Education, Learning, Teaching, Sixth Form, Socio-Economic Status*

I. Introduction

In an increasing global economy, a significant number of students start college underprepared for a college-level course [1]. Studies have shown that without intervention a mere 10% will graduate, and with appropriate assistance up to 40% of those beginning college in developmental programs can earn a bachelor's degree [2].The success or failure in any course has a strong influence on students' choice of major, lifelong career and whether they graduate and qualify for meaningful jobs [3], [4]. In the Caribbean, the Caribbean Advanced Proficiency Examinations attempt to prepare students in the Sixth Forms forfour-year colleges and universities degree programs. [1]. TypicalCaribbean Studies courses have been taught via the traditional lecture method and this was used for years in schools in Guyana and the Caribbean, particularly at President's College.

President's College was commissioned in 1985 with the aim of training students to serve their country and to use their talents, experience and skills to develop the nation [5]. When President's College was launched in the 1980's, the vision of the institution was centered on excellence in education [5]. Another important feature of the institution was the recognition for tolerance and appreciation for diversity [5]. As a premiere institution in Guyana, there were three main criteria for selectin of students.First, students had to be among the top two percent at the Secondary Schools Entrance Examination. Second, students had to pass an interview. The third criteria relates to parents approval and willingness to permit their children to attend the college [5]. There were seven characteristics for students and nine for teachers at the inception of the college. These characteristics include: innovation, production, moral and social consciousness, commitment to service, loyalty, high level of discipline and order and physical, mental and emotional stability [5]. One of the most significant aspect of the college was its unique curriculum, which was developed by teachers and curriculum specialists specifically for the institution. The curriculum included areas such agriculture, mathematics, science, and technology as well as innovation, which was an important aspect at the college [5].

Currently, the progress in information and communication technologies has changed the social, landscape resulting in greater economic, political, educational, social, and cultural development [6]. The increase in computer technologies has also made it easier for instruction. Given the paradigm shift in technology, it has become an increasingly important and significant factor in the development of learning and instructional programs [6]. This development in information and computer technologies has created integration into instructional programs, thereby enhancing the level and quality of education [7].

1.1Background to the Study

The advent and proliferation of Information Communication Technologies has led to new and improved teaching strategies and learning outcomes for students. The focus on Caribbean Studies and the way it is taught was due to its growing importance as a compulsory subject at the Caribbean Advanced Proficiency Examination (CAPE). The Caribbean Advanced Proficiency Examination is a regional examination administered by the Caribbean Examinations Council (CXC), the main testing organization in the Caribbean. This subject is a compulsory requirement for the award of any associate degree offered by the Caribbean Examinations Council. Two sixth form classes at President's College consisting of students with the same entrance requirements were chosen for the study

This study was undertaken to determine the extent to which Computer Aided instruction in Caribbean Studies affected the performance of Lower Sixth students at theCollege. Interestingly, digital technologies have redefined the delivery of education and has led to the compression of time and space, thereby creating more opportunities for students to learn [8]. Thus Computer Aided instruction has become an extremely popular method among teachers, even though their pedagogical effectiveness in enhancing the learning outcomes of students is sometimes questioned [9]. Beetham and Sharpe (2013) point out that technologies have changed the way ideas and information are transmitted to human beings, and this has resulted in a paradigm shift on the nature of knowledge and learning. [10]. Lou, Robinson and Park (2014) note that when performance is supported by computer technology, students are more likely to develop good attitudes towards assessments in their classrooms [11]. This is due in part to the benefits to be derived from such implementation and the impact on learning outcomes.

1.1.1 Objective of the Study

The objectives of the study are as follows:

1. To know the effects in the learning outcomes in Caribbean Studies for students taught through the lecture method and Computer Aided Instruction.
2. To differentiate among male and female students aptitude for success through the use of the lecture method and computer aided instruction
3. To identify the variables that affect students success in Caribbean Studies through the lecture method and computer aided instruction.

1.1.2 Purpose of the Study

The study was designed to investigate the effects of Computer Aided Instructions in Caribbean Studies on the performance of students in the Lower Sixth Form at president's College.

1.1.3 Research questions

1. Are there any differences in learning outcomes for lower six students taught by the lecture method and computer aided instruction?
2. What is the difference between male and female lower six students' aptitude for success with the use of the lecture method and computer aided instruction?
3. What are the variables that affect lower six students' success by the use of the lecture method and computer aided instruction?

1.1.4 Hypothesis

1. There is no significant difference in the learning outcomes of males and females lower six students in Caribbean Studies taught by the lecture method and computer aided instruction

2. There is a significant difference in the learning outcomes of lower six students in Caribbean Studies taught by the lecture method and computer aided instruction

1.1.5 Significance of the study

This research is expected to provide empirical data on the effects of Computer Assisted Learning on the performance of students in the Lower Sixth Form who are enroll in the in Caribbean Studies program. The study will also provide valuable information to policy makers and stakeholders in education, given the growing importance of Information Communication Technologies (ICT) in the delivery of education in Guyana.

II. Review Of Literature

The review of literature is guided by recent research which attempts to assess the effectiveness of Computer Assisted Instruction (CAI) on the academic performance of students. Computer Aided Instruction has been the focus of many studies due to its significance in providing a viable teaching option [12], [13], [14], [15], [16], [17]. Pondhe (2011) and Kocakaya (2010) have investigated the effects of computer instructions on students' scholastic achievement and found that there were many positive effects of modifying pedagogy on students' academic performance. Maycock (2018) believes that the widespread integration of computer in education has led to many benefits on key end-users. This view is supported by Apperson, Laws and Scepansky (2006) who posit that they are many advantages of Computer Assisted Learning (CAI) [18]. These advantages include: the application of viable teaching methods, the provision of equal opportunities, for all students by utilizing the same programmes, removing fear and enhancing meaning learning experiences among students'. In addition, the provision of equal opportunities for all students in the classroom is central to the learning process, students' experiences and their fundamental rights [19]. Therefore, in the delivery of education, inclusive practices and policies are pivotal to the learning experiences of students' and the promotion of inclusion [20].

As such, this study is guided by Piaget's Theory of Constructivism which suggest that human beings construct knowledge and meaning from their experiences [21].Constructivism is viewed as an approach to teaching and learning based on the idea that cognition results from mental construction [21]. According to Olusegun (2015) the constructivist view of learning takes into account the learner as an important element in the acquisition of knowledge. This statement is supported by Dennick (2016) who posits that students learn from a wide range of pedagogical processes. While research has shown that some ways of learning are viable than others, there is no single method that is supreme [22]. In addition, the constructivist view of learning can give direction to a number of different teaching methods and this can be accomplished by encouraging students' to use active techniques such as experiments and real world problem solving models. Similarly, the development of different types of educational software that work on the basis of complex cognitive modes of thinking rather than just repetition is the result of the constructivist view of learning [18].

In line with this concept, there has been a surge of interest in the literature to investigate the influence of CAI on students' creativity, attitudes to subject matters, and increasing the outcome of learning [12].According to Maycock (2018) traditional lecturing is viewed negatively since learners are subjected to a didactic approach of learning and sometimes suffer as a result of this experience. However, studies have shown that adopting Power Point presentations in classroom instructions enhanced clarity, organization and interest among students, though final examination grades were not greatly influenced [18], [23]. Apperson et al (2006) suggest that there could be direct positive effects on the learning outcomes of students if teaching is adopted to suit their individual learning needs.

Like Apperson et al (2006), research conducted by Wishart (2002) has also found that learners who are exposed to computers have greater self-assurance, confidence and self-efficacy, when compared to those who are taught in traditional learning environments where Information Communication technologies (ICT) is unavailable. Thus, exposure to computers and its programmes create a user-friendly environment that stimulates human interaction [24]. It is within this context that the current study examined the effects of Computer Aided Instruction on the academic performance of students' in the Lower Sixth Form at President's College.

III. Materials and Methods

3.1 Research Design

A pretest–posttest control group design was used in this semi-experimental research, which compares the effectiveness of two teaching methods, the traditional lecture based method and the computer aided method on the performance of the Lower Six Caribbean Studies students at President's College. The Randomized Group Pretest Posttest Design was employed for this research. Thirty six (38) students were selected to participate in the study. The students were randomly assigned into the two groups- eighteen students to the control group which was taught using the traditional lecture based method and the eighteen students to the treatment group which was taught using the computer aided method. The students were given a pretest based on the topic: Issues in Caribbean Development, which included several core areas such as Gross Domestic Product, Gross National Product, Qualitative Indicators and Factors that promote or hinder development. The pre-test was done simultaneously for both groups before treatment was administered. A post test was conducted one week after the teaching session. Several statistical tests were conducted and the results of these tests were analyzed. The methods are briefly outlined as follows:

1. Traditional Lecture-Based Method (Control Group) – The teacher served as the primary source of information and the students passively receive the information presented them. The session lasted for one (1) hour during which the participants were asked questions relating to the content covered.

2. The Computer Aided Method (Treatment Group) - A presentation was prepared using Microsoft Office- Power Point. The presentation covered the same content as the traditional lecture based method.

3.1.1 Population

The population for this study consisted of fifty (50) students between the ages of 16-19 years, who were enrolled in the Caribbean Studies programme at the Caribbean Advanced Proficiency Examination (CAPE) level. The population for this study was chosen from students who live in both low socio-economic and high income families. This was done to record any predisposed factors that may likely influenced students' performance in the subject.

3.1.2 Sample

The sample consisted of thirty eight (38) students who were registered to sit Caribbean Studies at the May/ June 2018 Caribbean Advanced Proficiency Examination (CAPE). Students for this study were selected by a simple randomization process and had a mean chronological age of 16.1 years. From the sample selected, sixty percent (60%) were females and forty (40%) males. In accordance with ethical requirements, only participants who had received consent from their parents were allowed to participate in the study.

3.1.3 Instrumentation

The study was a semi experimental type that examined the effects of Computer Aided Instruction on the academic performance of students in Caribbean Studies. A pre-test post-test control group design was used to achieve the required outcomes. Caribbean Studies Achievement Test was used as a research instrument and comprised of six levels of cognitive domain namely: knowledge, comprehension, application, analysis, synthesis and evaluation. The test was developed from one unit of Caribbean Studies and was broken down into five main parts which included: Issues in Caribbean Development, Concepts and Indicators of Development, Quantitative Indicators (Measures) of Development, Qualitative Indicators (Measures) of Development and factors that promote or hinder development. There were six questions worth 120 marks in total. Each level of domain was tested in the Achievement Test. In addition, a Computer Attitude Questionnaire was also used to obtain specific information on students' attitudes towards the use of computers in Caribbean Studies.

3.1.4 Testing

Both control and experimental groups were exposed to the same pretest. This was done to eliminate any doubts of preferences or biases toward the participants of any of the two groups. In addition, the researcher administered the same pretest to the control group and the experimental group to control the testing in case there was sensitization as a result of the exposure to information relating to the pretest before the posttest.

3.1.5 Validity and Reliability

In validating the instrument and to ensure authentic outcomes, the test was validated through experts in the field of education with specific skills in assessment, measurement and evaluation. The validation included: criterion validity, content validity and construct validity. Apart from the validation process, reliability of instrument was achieved through a test retest reliability technique. For example, the test was distributed to thirty (30) students of another school who were not part of the sample for this study. The same test was administered after two weeks to the same group of students. In addition, the Pearson product moment correlation was applied between the results of the test and the reliability coefficient was found to be 0.810, which indicated that the instruments were reliable.

3.1.6 Data Collection and Analysis

Data was collected through a pretest posttest method and was organized, tabulated and analyzed based on descriptive statistics. In the analysis, mean, standard deviation, and inferential statistics i.e. independent sample t test through SPSS were conducted.

3.1.7 Procedure of the Treatment

Prior to the conduct of the experiment, formal approval was sought from the Principal (ag.) of the school where the investigation was conducted. The process began after approval was granted and students in the

control group were taught through the traditional teaching method. Those in the experimental group were taught through computer aided instruction.

IV. Presentation Of Data

Table 1 T Test Paired Sample Statistics

T- Test

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	16.6111	36	8.01883	1.33647
	Posttest	25.0278	36	10.56270	1.76045

Table 2 Paired Sample Correlations

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Pretest & Posttest	36	.409	.013

The correlation coefficient from the above table indicates that there is a moderate positive relationship between pretest and posttest scores.

Table 3 Paired Samples Test

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pretest – Posttest	-8.41667	10.32161	1.72027	-11.90900	-4.92433	-4.893	35	.000

There is a statistically significant difference between the pretest and post test scores taking all thirty eight (38) students into consideration.

Table 4 Showing difference between subject factors

Between-Subjects Factors

		Value Label	N
Group	1.00	Control	18
	2.00	Treatment	18

Table 5 Showing Dependent Variable Difference

Descriptive Statistics

Dependent Variable: Difference

Group	Mean	Std. Deviation	N
Control	-7.7778	11.00564	18
Treatment	-9.0556	9.86659	18
Total	-8.4167	10.32161	36

The table above indicates that there is a larger difference between the mean pretest and posttest scores for the treatment group (computer aided method group) compared to the control group (traditional lecture based teaching).

Table 6 Levenne's Test of Equality of Error Variance

Levene's Test of Equality of Error Variances[a]

Dependent Variable: Difference

F	df1	df2	Sig.
.000	1	34	.993

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + Group

Table 7 Showing Test between subjects Effects

Tests of Between-Subjects Effects

Dependent Variable: Difference

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Corrected Model	14.694[a]	1	14.694	.135	.716	.004	.135	.065
Intercept	2550.250	1	2550.250	23.346	.000	.407	23.346	.997
Group	14.694	1	14.694	.135	.716	.004	.135	.065
Error	3714.056	34	109.237					
Total	6279.000	36						
Corrected Total	3728.750	35						

a. R Squared = .004 (Adjusted R Squared = -.025)

b. Computed using alpha = .05

V. Results and Discussion

The inferential analysis of Table 1 indicates that there is a difference in mean scores for pre- test and post-test. The mean values highlight a significant difference in the results (mean= 16.61, SD= 8.01) and (mean= 25.02, SD= 10.56). Thus, it is evident from the above table that the mean score for the post-test is higher than the mean score for the pre-test. Table 2 depicts a Paired Samples Correlation of the pre-test and post-test to determine whether there is a relationship between the two groups. The correlation coefficient from the Table indicates that there is a moderate positive relationship between pre-test and post-test scores. This correlation is statistically significant.

Table 3 depicts a Paired Samples Test to determine whether the mean difference between the two groups observed is zero (0). The calculated t value was observed to be -4.893, which is significant ($p \geq 0.05$). The mean value vividly highlights that there is significant difference between the pre-test and post-test scores taking into account all thirty eight (38) students. Table 4 and 5 illustrates the difference between subject factors and Dependent variable respectively. In the Dependent variable Difference, the mean score for the control group was -7.71 and SD= 11.00, while for the treatment group, the mean score was 9.05 and SD= 9.86. This indicates that there is a larger difference between the mean pre-test and post-test scores for treatment group (Computer Aided Instruction) when compared to the control group (Traditional Lecture Based Teaching).

Table 6 depicts the Levene's Test of Equality of Variance and this was used to determine whether the samples have equal variances for the two groups in the study. The inferential analysis indicates that there is homogeneity of variance of the mean difference between the two groups. Table 7 shows the test between subject effects. This was done to represent the variability of a particular value of the two groups. The table indicates that there no statistically significant difference for the variation in scores between the control group and the treatment group. The partial eta squared value (0.004) indicates that only 0.4% of the total variability in the difference in scores can be explained by the groups themselves.

In analyzing this situation, the study was undertaken to examine the effects of Computer Aided Instruction on the academic performance in Caribbean Studies for students in the Lower Sixth Form at President's College. A pre-test post-test control group design was used and students were placed in two similar

facilities. Students in the experimental group were taught in a room equipped with computer, multimedia and other technology related equipment, while those in the control group were taught through the traditional lecture method. The experimental process lasted for approximately five (5) weeks. Thereafter, students of both groups were given a post-test in order to compare their performance.

VI. Findings

The findings indicate that students' in the experimental group were more attentive, alert, excited and interested in the lesson as compared to students in the control group. Those in the control group displayed signs of boredom and inattention. Therefore, it can be seen that Computer Aided Instruction has a positive effect on students' academic performance in Caribbean Studies.

Based on the inferential analysis of the academic performance of the experimental and control groups, the study revealed that students of the experimental group had larger differences in mean pre-test and post-test scores compared to those in the control group. In sum, the findings of the study indicates that Computer Aided Instruction is a more viable teaching method than the traditional lecture based method.

VII. Conclusion

The study highlighted the effects of Computer Aided Instruction on the academic performance of students' in Caribbean Studies in the Lower Sixth Form at President's College and was the first of its kind to be conducted at the school. It was revealed that the use of computers, multimedia and other technology related equipment has a positive effect on the academic performance of students' in the Lower Sixth Form. It is recommended that similar studies be conducted at other Secondary schools in Guyana where students sit the Caribbean Advanced Proficiency Examinations (CAPE). Further, teachers teaching other CAPE subjects such as Integrated Mathematics, Entrepreneurship, Green Engineering, Literatures in English Communication Studies and History should adopt Computer Aided Instruction approach in their classrooms in order to enhance students' learning experiences.

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