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The Effect of Home Assignments on the Performance of Students in Computer Science

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ABSTRACT: *One cannot overstate the importance of homework in educational environments. In addition to helping students become more motivated learners, homework also gives students a chance to connect their educational experiences with those of their families, gives parents and teachers a chance to observe and provide comments, and helps students get ready for upcoming sessions. Many secondary school teachers still approach home assignments with humour despite the many advantages they have for both teaching and learning. While many teachers do not want to provide homework to their students some do, but they do not evaluate or mark the tasks. To ascertain how homework influences students' performance in computer science classes, this study sought to answer that question. The research used a descriptive survey methodology. The sample for the study is made up of 195 Senior Secondary School 1 (SSS 1) students who were randomly selected from the two local government areas in Ekiti State. The researchers' two Computer Science Achievement Tests (CSAT1 and CSAT2) served as the data collection tools. Three hypotheses in total served as the study's guiding principles and were examined using Analysis of Variance (ANOVA) in the Statistical Package for Social Science (SPSS) version 23 at the 0.05 alpha levels. The outcome showed that there is no appreciable difference in performance between high-ability, average-ability, and low-ability students in computer science when homework assignments are neither graded nor corrected. As a result, it was recommended, among other things, that whenever a home assignment is given to students, a class oral evaluation on the assignment must be scheduled once it has been turned in and teachers should always emphasize on the benefits students stand to earn from finishing home assignments on their own rather than making them complete their homework at all costs.*

KEYWORDS: effect, home assignments, students' performance, computer science

INTRODUCTION

The computer is widely regarded as one of the century's most significant breakthroughs. It is now exceedingly impossible to execute any transaction in industrialised nations without the use of a

computer, which has grown into a crucial instrument in the quest of social and governmental progress. Expertise in information and communications technology is essential in nearly every human endeavour, from defence and medicine to transportation and commerce to government and education to agriculture and aviation to research and industry (Gidado, 2020). In Nigeria and other emerging countries, our reliance on technology is increasing. We rely less on the old postal mail delivery system and more on computers for both basic and sophisticated computations (Jeno, et al., 2019). We no longer use paper and pencils in our workplaces for typesetting and creating drawings. All of these are now feasible because to computer development. As a result, it's not hyperbole to claim that computers are used in every sphere of human activity and that their potential applications span virtually every facet of human life. The ongoing discussion demonstrates that computers are now a crucial part of every development effort. Therefore, if a nation is serious about competing in the 21st century, it must invest heavily in educating its citizens about computers.

The goal of computer education, according to Amah (2019), is to help students become proficient in both the hardware and software of modern computers. One can utilise computers to do activities if they learn the basics of how to operate them (Jeno, et al., 2017). In addition to the fundamentals of computing, many other fields and occupations are represented in the realm of computer education. The development of essential digital literacy abilities that enable individuals to utilise technology successfully for communication, information retrieval, and problem-solving is one of the reasons why computer science education is highly valued in today's society (Kop, 2011). In addition, a degree in computer science can lead to employment in a variety of related industries, including but not limited to: software development, data science, cyber security, AI, and many more. By assuring national security, encouraging digital citizenship, and aiding in appropriate data analysis, computer science aids global problems. It gives individuals the tools they need to succeed in the modern world, advance technology, and address pressing issues in a wide range of fields (Wang, et al., 2019). Therefore, the significance of computer science education to a country's development can't be overstated. To help its citizens learn about the benefits of computers and how to use them, Nigeria began including computer education into its secondary curricula in 1988 and later included it in its university curricula. The National Policy on Computer Education was created with the following objectives to help attain this goal:

i. Catch up with the rest of the world
ii. Be ready to enter the 21st century of high technology where computer will undoubtedly be at the centre of it all, as the sophisticated and most enabling tool.
iii. Be able to land on jobs demanding computer knowledge.
iv. Enhance operational efficiency and management, and to open an almost infinite scope for human endeavour; and
v. Above all to regulate the proliferation of microcomputer and its integration within the education system,

It is unclear how far the aforementioned positive objectives have come. The dismal level of our developmental achievement in the twenty-first century is largely attributable to our failure to provide our youngsters with adequate computer education and infrastructure. We saw disappointing outcomes in the implementation of our developmental policies since we relied on the manual method of monitoring their implementation. To escape this state of underdevelopment, however, we must actively promote computer education in the twenty-first century. The National Policy of Education, the National Policy on Computer Education, and the concept of development all agree that a country with a computer-literate population will experience considerable gains in the developmental indices.

Homework refers to any (academic) task or project that a teacher gives to a student to complete outside of class. Students can study one of three instructional frameworks offered by Armstrong (2010) and De-Araujo et al. (2016) and demonstrate their understanding of the content by completing a culminating project. The examiner can see that the candidates were successful in accomplishing their goals. There are several benefits for both students and instructors when computer science homework is assigned. They can allow students to put into practise what they've learnt in class outside of class, boosting both their competence and self-assurance. Students gain valuable experience in time management through the completion of homework assignments at home. This not only encourages students to think critically and imaginatively about how to address problems, but also helps them take ownership of their own education. By reinforcing what they learn in class, promoting individual study, and assisting them in developing a better understanding of the subject, homework aids students in learning computer science. When homework is well-planned and in accordance with learning objectives, it may significantly enhance students' learning results and overall experience with computer science education. Could home assignments help improve students' performance in computer science in secondary schools?
The major objective of this study is to determine how homework affects students' performance in computer science classes. The study's specific goals are to:

1. determine the difference in academic performance among the three groups of high achievers before and after receiving home assignments;
2. determine the difference among the three groups of average achievers before and after receiving home assignments; and
3. determine the difference among the three groups of low achievers before and after receiving home assignments.

Research Hypotheses

1. There is no significant difference in the academic performance of the high achievers in the three groups before and after giving home assignments.
2. There is no significant difference in the academic performance of the average achievers in the three groups before and after giving home assignments.
3. There is no significant difference in the academic performance of the low achievers in the three groups before and after giving home assignments.

LITERATURE REVIEW

Homework, often known as home assignments, is a teaching technique that has been used for centuries. Students are often tasked with completing homework assignments outside of class. Reading assignments, problem-solving activities, research projects, essays, and other types of homework that complement and enhance classroom education are all examples of what this category encompasses. When home assignments are included into school settings, they help students, teachers, parents, and counselling in many ways. For instance, according to a study by Gidado and Mustapha (2021), students who have regular homework assignments are more likely to demonstrate improved critical thinking, time management, and self-discipline, as well as a deeper understanding of the material covered in class. Giving pupils homework assignments stimulates active participation in education, which promotes active learning as opposed to passive information absorption.

In addition, students can engage in independent study thanks to homework, which encourages them to pursue their own interests outside of class. In addition to preparing students for upcoming classes, homework also allows instructors and parents to reflect on students' work and provide comments (Chaya, 2021; Haq, et al., 2020). There is still some debate on whether or not homework is beneficial to students' education, despite the positives that have been cited. Proponents of homework argue that it helps students learn and perform better in the classroom; opponents point out that it can have unintended consequences such as increased stress, less time spent with loved ones, a heavier workload, technical difficulties, student dishonesty, a lack of parental oversight, and a wider gap in academic achievement. Whether or whether assigning homework to students in secondary school improves their performance in computer science is now the most pressing issue in this field.

The effects of homework on academic achievement have been studied by academics. In their research on computer science education in junior high schools in Ado-Ekiti, Ekiti State, Ajayi and Okoh (2021) discovered no indication of a substantial association between take-home assignments and students' academic achievement. They also saw no appreciable shift in the kind of computer studies homework and class activities given to pupils. The study also concluded that there was no correlation between students' participation in class and their homework assignments, and that there was no correlation between homework assignments and students' academic success in computer studies. Lack of a meaningful connection between assignments and student performance may contribute to the fact that many of these students do not stick to their assignments, resulting in plagiarism and cheating. A parallel study by Prommin and Jutharat (2019) found that, despite having negative psychological impacts on learning and interfering with students' ability to effectively manage their free time, homework nonetheless supported and encouraged students' academic progress. They also concluded that students benefited from homework assignments in terms of content mastery, skill development, and academic performance. Not only did they find that the internet was one of the most effective tools for students' learning and homework material,

but they also found that homework assignments helped students build cooperation skills and positive teacher-student relationships for homework clarification. Furthermore, Ojo and Oyewole (2019) found no significant difference in the performance of high achievers in the three groups before and after assigned homework. The average performance across the three groups was also not significantly different before and after homework was assigned. Last but not least, they found no appreciable change in low-performing students' grades across the three groups either before or after the distribution of homework assignments. This suggests that the experimental area did not suffer any unfavourable effects from homework. To the best of this researcher's knowledge, no studies on computer science have been done in Ikere Local Government Area, despite studies on homework and student performance having been done in other Local Government Areas in the state of Ekiti. Therefore, the purpose of this study is to determine how homework affects students' performance in computer science classes.

Theoretical Framework

Based on the work of psychologists Edward L. Deci and Richard M. Ryan in the 1980s, the Self-Determination Theory (SDT) provides the theoretical framework for the present investigation. The focus of this theory is on the role that intrinsic motivation plays in shaping individual and community flourishing. Three essential psychological demands are identified in this theory: relatedness, competence, and autonomy. When these needs are addressed, people are more likely to be motivated, involved, and progress as individuals. Self - Determination Theory (SDT), a branch of motivation theory, holds that an individual's motivation for a specific activity in a specific domain is more important than their overall level of motivation. The theory proposes a continuum from which motivation can be viewed, from external to internal, and differentiates between external motivation (performing an action to receive praise or avoid criticism) and internal motivation (performing the action because it has meaning or value to the individual). Internal motivation has been related to better performance than external incentive (Larionova et al., 2018). There is a wealth of literature on the application of SDT in traditional education. Numerous studies have found that both internal motivation and the more autonomous kinds of extrinsic reward boost student engagement and successful learning in a range of educational settings (Niemiec & Ryan, 2009). By combining principles from Self-Determination theory into the design and implementation of homework assignments, computer science teachers may create a learning environment that promotes students' intrinsic motivation, autonomy, and competency. Throughout their time studying computer science, this increases their motivation, tenacity, and general well-being.

METHODOLOGY

The research used a pre-test post-test quasi-experimental design approach. For the study, 195 students were drawn from two schools located in two nearby school districts. The schools were located in two different local government areas: Ado Local Government Area and Ikere Local Government Area. One hundred ninety-five (195) students from Senior Secondary School 1 (SSS 1) were purposely selected. The sample was divided into three groups, each with 65 participants.

Regular homework assignments were given to students in group 1 and were marked and revised. Regular home assignments were given to Group 2, but they were not graded or revised. Group 3 students received no home assignments at all. Each group was thereafter subdivided into three high, average, and low abilities. The division was based on the students' scores in the pretest. The frequency distribution of students is shown in Table 1.

Table 1
Frequency Distribution of the Pretest of Students from Three Groups

Description	Score Range	Group 1	Group 2	Group 3	Total
High ability of students	15+	8	14	16	38
Average ability of students	10-4	39	33	34	106
Low ability of students	0-9	18	18	15	51
Total		65	65	65	195

The study covered the teaching of four topics, which include the following:

1. Hardware and Software Operations,
1) Physical operations of digital technologies,
2) Browsing, searching and filtering data,
3) Information and digital contents.

Based on the prior knowledge of the students who participated in the study, a standard pretest was administered. Following the pretest, group 1 students received four sets of home tasks based on the study's topic. Homework assignments 1-3 each had five multiple-choice test questions. Ten multiple-choice test items made up the fourth home assignment. Each set of assignments was handed to the students in Group 1. In each instance, the work was graded, recorded, and marked. The students were given their test papers, and corrections were made for them. The same set of homework tasks as those assigned to Group 1 students were also given to Group 2 students. However, none of their work was scored, recorded, or noted. No home assignments were assigned to the students in group 3. The three groups were instructed by three separate teachers. The teachers were all required to have a teaching credential, and this was done to maintain uniformity. The study had four sessions of 35 minutes each over the course of the three weeks.

The researcher developed the Computer Science Achievement Test1 (CSAT1) and Computer Science Achievement Test2 (CSAT2) as the study's instruments to gather data from the participants. The CSAT1 covered the subjects that are essential to the instruction of the primary subjects. They act as foundational information for the primary lesson. The goal of CSAT1 was to determine the participants' prior knowledge as well as to serve as a foundation for dividing the participants into three ability groups (High, Average, and Low). A 40-item objective test was given. The objective 50-item CSAT2 assessed a student's knowledge of the subjects covered in

class as well as their intellectual comprehension and application of those subjects. Finding out how much the students had learned during the lesson was the goal. For the test, a total of 100 points were given. These evaluations were given to 50 separate items. Each response received two points. Objective test questions on the CSAT1 and CSAT2 have five alternative answers, ranging from A to E. CSAT1 had a 40-item test, whereas CSAT2 had 50 items. The validity of the instruments was assessed using face and content validity techniques. This was done by ensuring sure the test questions were well-written and covered the material that was taught. The test items were the adapted from the West African Examination Council (WAEC) and the National Examination Council (NECO). It was determined that the questions were reliable because they were modified versions of typical exam questions.

The mean and standard deviation were used to assess the demographic data collected for the experiment's pre-test and post-test. The three hypotheses were tested using the Statistical Package for Social Sciences (SPSS) version 27 and the Analysis of Variance (ANOVA) statistic. Each hypothesis was tested with at 0.05 level of confidence.

RESULTS AND DISCUSSION

Table 2: Mean and Standard Deviation of Students Score in Pretest and Post-test for all the Groups

		PRETEST		POSTTEST	
DESCRIPTION	**GROUPS**	**MEAN**	**STANDARD DEVIATION**	**MEAN**	**STANDARD DEVIATION**
HIGH ABILITY STUDENTS	1	18.00	3.969	15.63	5.314
	2	17.57	1.243	19.71	3.991
	3	20.56	6.460	16.12	4.611
AVERAGE ABILITY STUDENTS	1	11.39	1.097	13.56	2.904
	2	12.35	1.198	13.61	2.842
	3	12.29	1.142	14.82	4.783
LOW ABILITY STUDENTS	1	7.39	1.296	12.83	3.186
	2	7.22	1.549	13.67	4.533
	3	8.33	0.792	14.93	5.158

The participants' averages and standard deviations for the pretest and posttest were displayed in Table 2. The chart showed that, except for group 2, the mean scores for high-ability students were lower for all three groups. The fact that the standard deviation was consistently higher for the three groups in the post-test, even though this outcome was unexpected, suggests that the range of the results was better. The introduction of home assignments to the high ability, however, had little effect, according to this study. The table indicated that the mean scores were higher on the posttest than on the pretest for all three groups of students with average ability levels. This shows how the participants in this category have been impacted by home assignments. Additionally, the data showed that low-ability students had mean scores that were higher on their posttest than on their pretest. In conclusion, it was clear that students with low ability levels benefited the most from home assignments, followed by those with middle ability levels and high ability levels.

Hypothesis 1: There is no significant difference in the academic performance of the high achievers in the three groups before and after giving home assignments

Table 3: ANOVA Table for the High Ability Students in the Three Groups

Adjusted										
Sources of Variables	Df	SSx	SSy	S_{XY}	SS_Y	df	MSS	F_c	F_t	Result
Group (Treatment)	2	75.379	123.675	-62.493	191.232	2	95.616	4.992	34.05	N.S.
Error	35	815.311	651.169	-0.402	651.169	34	19.152			
Total	37	890.306	677.842	-62.892	770.401					

N.S. = Not Significant at P < 0.05

Table 3 shows that the F-calculated (F_c) is less than the F-table (F_t) (since 4.992< 34.05). This demonstrates why the idea that there is no discernible difference should not be disproved. That is, the high-ability students' post-test performance did not significantly improve as a result of frequent home assignments. Additionally, home assignments that are neither graded nor corrected have no discernible impact on how well high-ability students perform in computer science in the studied area.

Hypothesis 2: There is no significant difference in the academic performance of the Average achievers in the three groups before and after giving home assignments

Table 4: ANOVA Table for the Average Ability Students in the Three Groups

Adjusted										
Sources of Variables	Df	SSx	SSy	SSx	SS_Y	df	MSS	F_c	F_t	Result
Group (Treatment)	2	22.036	47.013	19.330	31.229	2	15.613	0.735	102.5	N.S.
Error	103	163.925	2232.383	103.519	2167.011	102	21.245			
Total	105	185.962	2279.396	122.849	2198.240	104				

N.S. = Not Significant at P < 0.05

According to Table 4, the F_c is 0.735 whereas the F_t is 10205. The hypothesis of no significant difference should not be discarded since the F_c is greater than the F_t. In other words, there is no discernible difference between the three groups' performance levels for students of average ability. In other words, the ordinary student's competence is not much impacted by assignments that have been graded and corrected.

Hypothesis 3: There is no significant difference in the academic performance of the low achievers in the three groups before and after giving home assignments;

Table 5: ANOVA Table for the Low Ability Students in the Three Groups

					Adjusted					
Sources of Variables	Df	SSx	SSy	S_{XY}	SS_Y	df	MSS	F_c	F_c	Result
Group (Treatment)	2	11.435	36.253	17.069	38.187	2	19.094	0.9453	47.05	N.S.
Error	48	82.722	951.433	-13.167	949.337	47	20.199			
Total	50	94.157	987.686	3.902	987.524	49				

N.S. = Not Significant at P < 0.05

According to Table 5, the F_c is 0.9453 whereas the F_t is 47.05. The hypothesis of no significant difference should not be discarded because the F_c is less than the F_t. This indicates that there is no statistically significant difference in the mean post-test scores of the low achievers in the three groups. Homework that has been marked and corrected has the same impact on low-ability students' performance as homework that has not been marked or corrected.

DISCUSSIONS

The goal of the study was to determine whether giving computer science students homework will significantly affect the students' performance. The varied outcomes of the students' computer science homework assignments from the field of study have little to no impact on how well they perform in the subject. Table 2 illustrates that assigning homework to students could not be viewed as a time waster because it reveals a significant difference between the mean scores of high achievers and low achievers, a difference that reached eleven (11) in the pretest and three (3) in the post-test. This demonstrates how the high and low achievers in the class both performed better after having their home assignments marked and corrected.

Additionally, it may be observed that home assignments, whether graded or not, have a beneficial (albeit possibly insignificant) impact on students with average or low ability. One could infer from the pre-test standard deviation that the categorization of average and low-ability students is more reliable and stable than that of high performers. The dramatic decline in the high achievers' mean scores could be explained by this. As a result, it is preferable to always offer home assignments, even if they are not graded.

The conclusions of this study are at odds with those of Prommin and Jutharat (2019), who found that assigning homework helped and boosted students' education. This study supports the findings of Ojo and Oyewole (2019), who discovered no discernible difference in the performance of the high achievers in the three groups before and after assigning homework in Mathematics, and Ajayi and Okoh (2021), who discovered no evidence of a significant relationship between homework assignments and students' academic performance in Computer Science. This may be due to how the teacher envisioned the lecture, how the assignment was handled, or how the students responded to the homework they were given. It was disheartening to find that even students who did well on their assigned homework performed badly on the corresponding in-class work; some of them could not correctly answer even the simplest questions. The success of a student in completing a sequence of homework assignments is not indicative of that student's overall academic performance. This may be due to the fact that most students see homework more as a means to appease their professors than as an opportunity to learn.

According to the Self-Determination, the children in this study may have been influenced by external motivation, in which case they engaged in homework with the purpose of getting rewards or avoiding punishment, as postulated by the Social Developmental Theory (SDT), upon which this study is based. Students must be motivated internally, say Ryan and Deci (2017), in order to benefit from homework assignments. They should take part in the events because they have some meaning or value for them or because they sound like entertaining or interesting experiences. It seems to reason that if kids do their homework and benefit from it, they will do better than those who do not have any assignments at home. This is owing to the fact that 10% of the pre-test's total questions were relevant to the homework assignments given. In comparison to their contemporaries who received no home assignments at all, individuals who were exposed to home assignments have a 25% edge.

CONCLUSION

Finding out how homework impacts students' performance in computer science classes is the main goal of this study. Three groups with a total of 65 participants each were randomly selected from the sample. Students in Group 1 received regular homework tasks, which were graded and amended. Group 2 received regular home assignments, but they were not graded or amended. The children in Group 3 had absolutely no homework. Following that, each group was separated into three categories: high, average, and low talents. The study's findings revealed that low-ability students gained the most from homework, followed by intermediate-ability students and

high-ability students. The results also demonstrated that a student's performance on a number of homework assignments is not a reliable indicator of academic competence. In order to motivate students' progress and allow for self-evaluation of their performance, computer science teachers should offer homework to all student groups.

Recommendations

The results of the study suggest that teachers of computer science should place a greater emphasis on homework for students of intermediate and lower skill levels. Homework assignments that require student completion outside of class time must be followed by a planned in-class oral examination. This will let the instructor determine whether or not the pupils have fully grasped the issue at hand. Teachers should not try to nudge pupils into doing their homework; rather, they should highlight the benefits of doing it on their own. Rather of focusing on students' performance on homework assignments, teachers should encourage them to do the work on their own at home. Instructors are not obligated to evaluate each and every student's homework, but they should at least keep a record of how the assignments are doing. They should also check in on occasion to see how their pupils are doing by looking at a sample of their homework. Rather of simply copying, students should actively participate in class correction. Lastly, teachers should try to give a range of homework assignments to students of varying abilities and periodically have students help with marking and assessing their own work.

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