

MEASURES OF STUDENTS' STUDY HABIT AS PREDICTORS OF ACADEMIC ACHIEVEMENT IN CHEMISTRY

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Abstract

The study investigated 8 measures or subscales of study habit as predictors of academic achievement in Chemistry. A total of 601 one Senior Secondary II science students participated in the study. The students were drawn through a stratified random sampling technique from 45 senior secondary schools in the Nigerian Federal Capital Territory (FCT). The instruments used for data collection were Students' Study Habit Inventory (SSHI) and the Chemistry Achievement Test (CAT). The SSHI was adapted from Bakare 1977, CAT was developed by the researchers. Reliability coefficients of 0.78, 0.81, which were obtained using Crombach coefficient Alpha, were established for SSHI and CAT, respectively. The instruments were administered on the students for a period of four weeks by the researchers with the assistance of the Chemistry teachers. The data collected were analyzed using mean, standard deviation and multiple regression analysis. The finding of the study indicated that while the Chemistry students possessed fairly good study habits, study habit measure (subscales) like homework and assignment negatively predicted

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Introduction

Students' academic achievement is affected by many factors. Some of these factors could be cognitive and others non-cognitive. One of the non-cognitive factors that could affect students learning achievement is study habit. The concept of study habit combines nearly all other sub-topics under it such as study attitude, study method, and study skill. Clearly, there are basically two concepts of interest which are "study" and "habit". While Mace (2002) pointed out that study is a systematic acquisition of knowledge and an understanding of facts and principles that calls for retention and application, Fernández (2012) defines habit as simply an acquired or innate tendency to display a certain kind of behavior each time circumstances of a well-determined character occur. Habit is thus marked by continuity and by a constant and recurrent mode of adaptation.

Two distinct perspectives, coming from two different academic disciplines, tend to dominate discourses on the concept of habit: psychology, and sociology. In the former, habit appears as a psychological construct, and a factor influencing behaviour and in the latter, habits appear as routine practices (Darnton, Verplanken, White & Whitmarsh, 2011). In the psychological perspective, habits are taken to be a certain type of behaviour in themselves. More precisely, habit is also identified as a factor in those behaviours, interacting with other key factors such as attitudes, norms and intentions, to determine behavioural outcomes (Darnton, et al, 2011; Holland, Aarts, &Langendam, 2006). From the psychological perspective therefore, habits are formed through repetition. In the sociology perspective, habits are understood as routine practices, taken as a whole, and arising from the ongoing interactions between individuals and social structures, institutions, or rules and resources (Holland, et al, 2006). Certain facts are derivable from the sociological perspective. According to (Darnton et al, 2011), these facts are that: 1) Habits are not simply defined by their frequency; the other aspects of habit involve automaticity (the absence of deliberation, or conscious thought), and a stable context (for a habit to be formed, the immediate environment in which the behaviour occurs needs to remain constant); 2) The extent to which a behaviour has become an established habit and is not driven by intentions – can be measured, using a set of survey questions which assess the frequency, automaticity and context stability of a behaviour for a particular person at a given point in time. In the context of the above, three factors that influence habit are frequency, automaticity and a stable context (Hobson, 2003 & Darnton, et al, 2011).

From the views of the authors cited above, study habit can be interpreted to mean a concept, which can be acquired (through routine practices and repetition). It could be described as an innate tendency to systematically acquire knowledge and an understanding of facts and principles that calls for retention and application. Thus, study habit, in a broader context, typically denotes the degree to which the student engages in regular act of studying that are characterized by appropriate studying routines (e.g., reviews of material) occurring in an environment that is conducive to studying (Egbujuo, 2017). According to Bashir &Mattoo (2012), study habits are a well-planned and deliberate pattern of study which has attained a form of consistency on the part of the students toward understanding academic subjects and passing at examination. Further, Crede and Kuneel (2008) posits that study habit is all about study routines, including, but not restricted to, frequency of studying sessions, review of material, self-testing, rehearsal of learned material and studying in a conducive environment. The features of study habit listed above connote the existence of regular

patterns in approaching study tasks. These patterns are made up of a combination of one or more individual tactics or techniques such as note taking (Wade, Trathen & Schraw 1990).

Some attempts have been made in order to differentiate between study attitude, study method, and study skill. Study attitude, as asserted by Hussain (2000) refers to predispositions which students have developed towards private readings through a period of time. According to him, study attitude offers great possibilities for successful achievement in studies. Ayodele and Adebisi (2013) have defined study method as the knowledge and application of effective study skills or techniques by students. Some study methods identified by the author include know-what-learn (KW- L-) survey-Question-Read-Recite Review (SQ3R), summarizing and note-taking, using graphics and self-questioning and a host of others. Bliss and Mueller in Mehraj and Qamar (2012) attempted to distinguish between study behaviour/habit and study skill. The difference, according to the authors, lies in distinguishing between potential and actual behavior. The authors explained that study skills are the specific techniques, steps or procedures that make up the study plan. Some of these procedures as enunciated by Gettinger and Seibert (2002) include: highlighting, outlining, note-taking, summarizing etc. that may be taught through explicit instruction.

A study behavior, by contrast, constitutes the overall approach itself, representing the student's concept of how to accomplish learning goals and the specific actions taken (Jones, Slate, Perez & Marini in Egbujuo 2017). The elements of study behaviors include, for examples study time planning, frequency of studying, duration of studying and choice and application of appropriate study skills (Mehraj & Qamar, 2012). Students' study habits have been seen to play critical role in their academic success. Bakare (1977) in his study habit inventory pointed out eight key sources of poor academic achievement. Study habit problems associated with student's response to home work and assignments; reading and note taking; time allocation; study period procedure; student's concentration; towards examination and teachers' consultation. These study habit sub-scale have been found to significantly correlate with students' academic achievement, although at varying degrees (Oluwatimilehin & Owoyele, 2012; Tukur & Musa, 2001).

Academic achievement is a complex student behavior and underlies several abilities, e.g., memory, previous knowledge or aptitude as well as psychological factors such as motivation, interests, temperaments or emotions, to name a few (Deary, Whiteman, Starr, Whalley, & Fox, 2004). Educational psychologists and researchers have argued that there are many determinants of academic achievement (Chamorro-Permuzic & Furnham, 2003), and one of such determinants have been found to be study habit (Crede' & Kuncel, 2008 and Ossai, 2011). Numerous researches done on what constitutes good study habits point to the following common elements: a) being organized in terms of notes, lessons, materials; b) having a regular time and place for studying lessons, and making decisions about priorities concerning time and goals; c) good parental models, early and consistent parental supervision, and learning-conducive home culture and environment; and d) personal responsibility over what one does and does not do (Charnley, 2006; Zolten & Long, 1997).

Bad study habit has conversely been found to result in poor academic performance. Robinson (2000) found that certain bad study habits result in poor academic performance whereas certain good study habits result in high academic performance. Based on data of National Assessment of Educational Progress, Creemers

and Reynold (2000) demonstrated a positive relationship between good study habits and academic performance of 8th and 9th Grade students. It thus could be said that good study habits do significantly enhance academic performance of the learners.

To ascertain the effect of study habit on students' achievement, Oluwatimilehin and Owoyele (2012) in a study of 300 male and female JS students of ages between 12 and 16 years reported that among the various aspects of study habits examined, teacher consultation correlated highest with Science ($r = .21$) followed by reading and note-taking with ($r = .20$). Homework and assignments had the lowest correlation ($r = .04$). In the overall, the authors observed that concentration contributed highest to Science performance followed by written work. They found that while study period procedures contributed lowest to academic performance in science, homework, assignments and time allocation contributed negatively to science performance of students.

Although the relationship between study habit and educational attainment appears to have been firmly established in studies all over the world, the findings are not consistent with each other. In a comparative study to find differences in study habits and academic performance between Pakistani British and White British students, Rana and Kausar (2011) revealed that although White British students had significantly better study habits than their Pakistani counterparts, there was no significant difference found in the academic performance of the two groups. The second finding revealed that country of origin and schools had a significant interactive effect on study habits but had no significant interactive effect on the academic performance of the students. Indeed, there is little evidence to support either the predictive or construct validity of the SSHA. In a small-scale study involving 26 undergraduate chemistry students Kim & Li (2012) found that there is a weak relationship between the number of hours studied per week and test scores. They also found that students who relied primarily on lecture notes as their study source outperformed their peers. According to Nonis and Hudson (2010) study time had more of a (positive) influence on student performance when students were able to concentrate. Some other studies show that study habit does not necessarily improve academic performance of students. Studies by Lawrence (2014), and Siddiqui and Fatima (2014) confirmed no significant relationship between achievement and study habit. Given the above scenario, this study seeks to further examine the relationship between students' study habit and their academic achievement with particular reference to chemistry. The study also sought to investigate the predictive strength of the various measures of study habit as propounded by Bakare (1977). The study specifically sought to determine the nature of chemistry

Research Questions

1. What is the nature of FCT chemistry students' study habit as measured by: (a) Homework and assignment (b) Study time allocation (c) reading and note taking (d) Study period procedure (e) Concentration (f) Written work (g) Examination, and (h) Teacher consultation?
2. To what extent does each of the measures of study habit predict students' achievement in chemistry?

Method

The study adopted a predictive research design involving 8 independent variable and one dependent variable. The population of this study comprised all the SSII

chemistry students and of the 56 public senior secondary schools in the Federal Capital Territory (FCT). These schools are located within the six Area Councils of the Federal Capital Territory (FCT). The 56 public senior secondary schools were stratified by area council and 45 were randomly by balloting, unevenly.

From each of the 45 selected schools, an average of 13 students in intact classes were randomly selected to participate in the study. In all 601 students participated in the study.

Two instruments were used for the purpose of data collection. These are the Students' Study Habit Inventory (SSHI) and the Chemistry Achievement Test (CAT). The SSHI, which was adapted from Bakare 1977, composed of 45 questions with 8 sections covering homework and assignment, time allocation, reading and note taking, study period procedure, concentration, written work, examinations and teacher consultation. The instrument has four response options of "never", "sometimes", "most-times", "always". CAT is a two-part researcher-designed instrument. Part A concentrated on students' demographic data and Part B contained 30 multiple choice questions covering areas of chemistry taught the students in SSI and first term of SS II. Specifically, chemistry areas covered in CAT are particulate nature of matter, chemical equations and combinations, gas laws, separation techniques, periodic tables, mass-volume relationships,

Carbon and its compounds, acids, bases and salts. Each question has four options, one correct answer and three distractors, from which the students selected the correct answers to the questions. Students' scores in CAT were used as a measure of their achievement in chemistry. Reliability coefficients of 0.78, 0.81, which were obtained using Crombach's coefficient Alpha, were established for SSHI and CAT, respectively. The instruments were administered on the students for a period of 4 weeks by the researcher with the assistance of the chemistry teachers. The data collected were analyzed using mean and standard deviation for research question 1 and multiple regression analysis for answering research questions 2. Boundary limits were set for the purpose interpreting the Students Habit Inventory (SHI). Items (habits) within the range of 3.50 and 4.00 were regarded as study habits that the students always engage in, items (habits) with the mean within the range of 2.50 to 3.49 were treated as habits that the often engage in. Also, items (habits) with the mean ranging from 1.50 to 2.49 were regarded as habits that the students sometimes engage in, and finally, items (habits) whose mean values are below 1.49 were regarded as never engaged by the students.

Results

Research Question 1: What is the nature of FCT chemistry students' study habit in term of (a) Homework and assignment (b) Study time allocation (c) reading and note taking (d) Study period procedure (e) Concentration (f) Written work (g) Examination, and (h) Teacher consultation?

Table 1: Result of Statistical Analysis of Students' Study Habit: Homework and Assignment

S/N	Statements	Mean	SD
1	When your assigned homework is too long or unusually hard, do you either stop or study only the easier parts of the lesson?	2.02	.81
2	If you have to be absent from class, do you make up missed lessons and notes immediately?	2.83	1.02
3	Even though an assignment is dull and boring do you stick to it until it is completed	2.66	.89
4	Do you put off doing written assignments until the last minute?	2.40	1.25
5	Do you complete and submit your assignments on time?	2.68	1.17
6	Do you begin your assignment as soon as the teacher gives them to you and not allow them to pile up?	2.40	.92
Average Mean		2.50	

Table 2: Result of Statistical Analysis of Students' Study Habit: Time Allocation

S/N	Statements	Mean	SD
7	Do you spend too much time talking or listening to the radio for the good of your study?	2.28	.88
8	Do you find that having many other things to do causes you to get behind in your school work?	2.67	1.07
9	Do problems outside of the classroom – with other students or at home – cause you to neglect your school work?	1.75	.96
10	Do you study for at least three hours each day after classes?	2.38	.89
11	Is your time unevenly distributed: do you spend too much time on some subjects and not enough on others?	2.60	.92
12	Do you spend too much time reading fiction (Novels), going out, etc. for the good of your school work?	2.56	1.09
Average Mean		2.40	

Table 3: Result of Statistical Analysis of Students' Study Habit: Reading and Note Taking

S/N	Statements	Mean	SD
13	In taking notes, do you tend to write down things which later turn out to be unimportant?	1.97	1.03
14	After reading several pages of an assignment, do you find yourself unable to remember what you have just read?	2.21	.88
15	Do you find it hard to pick out the unimportant points of a reading assignment?	2.32	.94
16	When reading a long assignment, do you stop now and then to try to remember what you have read	2.97	1.06
17	Do you have to reread materials several times because the words don't have much meaning the first time you go over them?	2.37	1.06
18	Do have trouble picking out the important points in the material read or studied	2.18	.88
19	Do you go back and recite to yourself the material you have studied, rechecking any point you find doubtful?	2.81	.93
20	Do you miss important points in the lecture while copying down notes on something which have	2.45	1.09
21	Do you pronounce words to yourself as you read?	2.50	1.26
	Average Mean	2.42	

Table 4: Result of Statistical Analysis of Students' Study Habit: Study Period Procedure

S/N	Statements	Mean	SD
22	Do you keep all your notes for subject together and carefully arranged for studying?	2.82	.98
23	Do you need a long time to get warmed up when you want to start studying?	2.42	1.00
24	Are you unable to study well because you get restless and unable to sit for long?	2.62	1.13
25	When you sit down to study, do you find yourself too tired, bored or sleepy to study well?	2.21	1.06
26	Do you prefer to study your lessons alone rather than with others?	2.45	.98
27	Do you seem to get very little done for the amount of time you spend studying?	2.51	.97
28	At the beginning of a study period, do you plan your work so that you will make the best use of your time?	3.14	1.03
29	Do you find yourself beset by too many health problems to study efficiently?	1.75	1.05
	Average Mean	2.50	

Table 5: Result of Statistical Analysis of Students' Study Habit: Concentration

S/N	Statements	Mean	SD
30	Do you find that day dreaming distracts your attention from your lessons while studying?	2.15	.94
31	Do you find it hard to keep your mind on what you are studying for any length of time?	2.43	.94
32	Do outside interruptions disturb you while studying?	2.72	1.08
Average Mean		2.43	

Table 6: Result of Statistical Analysis of Students' Study Habit: Written Work

S/N	Statements	Mean	SD
33	Do you correct errors on the papers which your teachers have marked and returned to you?	2.08	1.06
34	Do you have trouble saying what you want to say on tests, essays and other written work?	2.02	.83
35	Do your teachers criticize your written work for being poorly planned or hurriedly written?	2.27	1.90
36	Do you give special attention to neatness on essays, reports and other written work?	3.03	1.08
Average Mean		2.35	

Table 7: Result of Statistical Analysis of Students' Study Habit: Examination

S/N	Statements	Mean	SD
37	Do you do poorly on tests because you find it hard to think clearly and plan your work within a short period of time?	2.07	1.00
38	Do you get nervous and confused when taking a test and therefore fail to answer questions as well as you otherwise could?	2.06	.92
39	When getting ready for a test, do you arrange facts to be learned in some planned order?	2.67	1.02
40	Are you careless about spelling, punctuation and grammar when answering test questions?	2.34	1.75
41	Are you unable to finish tests within the time allowed although you work until the very last minute?	2.04	1.02
42	When tests are returned, do you find that your mark has been lowered by careless mistakes?	2.19	.90
43	Do you finish your examination papers and turn them in before time on the examination?	2.51	1.06
Average Mean		2.27	

Table 8: Result of Statistical Analysis of Students' Study Habit: Teacher Consultation

S/N	Statements	Mean	SD
44	When you are having trouble with a particular subject, do you try to talk it over with the teacher?	2.49	1.24
45	Do you hesitate to ask a teacher for further explanation on a point that is not clear to you?	2.21	1.20
Average Mean		2.35	

Tables 1 to 8 gives the result of the analysis of the students' study habit based on 8 measures (factors), which are homework and assignment, time allocation, reading and notetaking, study period procedure, concentration, written work, examination and teacher consultation. Each of the variables was measured with different items. The mean scores obtained for all the variables are higher than the mid-point of the scales used in measuring each of the 8 variables i.e., Homework and Assignment (Average Mean = 2.50), Time allocation (Average mean score = 2.40), Reading and note taking (Average Mean = 2.42), Study period procedure (Average Mean = 2.50), Concentration (Average Mean = 2.43), Written work (Average Mean = 2.35), Examination (Average Mean = 2.27), Teacher consultation (Average Mean = 2.35).

Research Question 2: To what extent do each of the measures of study habit predict students' achievement in chemistry?

Table 9: ANOVA^a

Model		Sum of Squares	Df	Mean Square	F	Sig
1	Regression	1436.129	8	179.516	10.051	.000 ^b
	Residual	10573.641	592	17.861		
	Total	12009.770	600			

a. Dependent Variable: ACHV

b. Predictors: (Constant), TC, HWA, SPP, TA, WW, RNT, CON, EXA

Table 9 shows that, overall, the regression model statistically significantly predicts the outcome variable (academic achievement in chemistry). Here, $p < 0.0005$, which is less than 0.05 and $F(8, 592) = 10.051$. Thus, the model is a good fit for the data.

Table 10: Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.346 ^a	.120	.108	4.22621

a. Predictors: (Constant), TC, HWA, SPP, TA, WW, RNT, CON, EXA

b. Dependent Variable: ACHV

Table 10 indicates that the 8 measures of study habit (predictors) explained 12% of the variance in academic achievement in chemistry ($R^2 = .120$; Corrected $R = .102$). This

thus implies that the prediction variables (measures of study habit) explains 12% of the variability of students' academic achievement in chemistry.

Table 11: Multiple Regression Analyses Predicting Academic Achievement in Chemistry from Measures of Study Habit

Model	Coefficients ^{aE}						
	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	10.463	1.442		7.253	.000	7.630	13.295
HWA	-.207	.058	-.142	-3.537	.000	-.321	-.092
TA	.150	.060	.107	2.500	.013	.032	.269
RNT	-.070	.048	-.064	-1.467	.143	-.164	.024
SPP	.079	.048	.073	1.632	.103	-.016	.174
CON	.315	.090	.157	3.496	.001	.138	.492
WW	.054	.071	.033	.768	.443	-.085	.193
EXA	.061	.043	.064	1.402	.162	-.024	.146
TC	.192	.106	.076	1.807	.071	-.017	.400

a. Dependent Variable: ACHV

Table 11 shows that Homework and Assignment (HWA) negatively but significantly contributed to students' academic achievement in chemistry (Standardized Beta (B) = - 0.142, $p < 0.05$). This entails that for every 1 full standard deviation increase in homework and assignment, students' academic achievement in chemistry decreases by 0.142 standard deviation unit at p , when all other variables are held constant. Similarly, reading and note taking negatively but not significantly contributed to academic achievement in chemistry ($B = -.064$, $p < 0.05$). However, concentration significantly and positively contributed to academic achievement in chemistry (standardized $B = 0.157$, $p < 0.05$). This implies that for every 1 full standard deviation increase in concentration, students' achievement in chemistry increases by 0.157 standard deviation units, when all other variables are held constant. Other measures of study habit (Time Allocation, Study Period Procedure, Written Work, Examination and Teacher Consultation) positively contributed but not significantly to academic achievement in chemistry. Amongst these measures, Written Work had the less on contribution to academic achievement in chemistry ($B = 0.033$).

Discussion of findings

The result of the analysis of the students' study habits shows that, apart from homework and assignment (Average Mean= 2.50), study period procedure (Average Mean = 2.50), students often engage in the habits used in measuring all the other 6 variables. Thus, students only sometimes engage in the activities used to measure their study habits in terms of Study Time Allocation, Reading and Note Taking, Written Works, Examination, Concentration and Teacher Consultation. Although, on a general note, the students could be said to be practicing study habits that may be adjudged fair except in some areas like teacher consultation. This implies that most of students, do

not consult their teachers when they run into difficulties in the course of their studies. A closer look at the tables (1 – 8) showed that other specific study habit areas where the students have problems are often spending too much time reading fiction (Novels), going out, etc. for the good of their school work (Mean = 2.56), often allowing outside interruptions to disturb them while studying (Mean = 2.72) and often being unable to study well because of restlessness and being unable to sit for long (Mean = 2.62). Deductively, students possess poor study habit in terms of concentration.

The results of the regression analysis shown in Tables 9 – 11 indicate that the contribution of the various study habit sub-scales to academic achievement in Chemistry is minimal and, in some cases, negative. Generally, study habit scales, when put together, contributed 12% of students' academic achievement in chemistry. A further probe into the individual contributions of the study habit subscales (measures) used in this showed that Homework and Assignment (HWA) negatively but significantly contributed to students' academic achievement in chemistry. Similarly, reading and note taking contributed negatively, though not significantly, to academic achievement in chemistry. This finding affirms the result of the study by Oluwatimilehin and Owoyele (2012), who found that while study period procedures contributed lowest to academic performance in science, homework, assignments and time allocation contributed negatively to science performance of students.

This finding may not necessarily mean that homework negatively affects students' academic achievement in chemistry, but the nature of homework given to students and how the students carry out the home may be the actual factor. For instance, according to Cooper (2001), parents trying to help with homework can confuse students if the parents is using different instructional techniques than the teacher. Homework can also lead to undesirable behavior such as cheating, through either copying other students' assignments or having someone else complete the work for

Concentration, as study habit subscale or measure, significantly and positively contributed to academic achievement in chemistry (standardized B = 0.157, $p < 0.05$). This implies that for every 1 full standard deviation increase in concentration, students' achievement in chemistry increases by 0.157 standard deviation units, when all other variables are held constant. Thus, when students devote time in both study and learning they tend to achieve better. Teacher consultation was found to, although not significantly, positively contribute to academic achievement in chemistry. This appears a bit different to the finding of Oluwatimilehin and Owoyele (2012) that teacher consultation contributes students' academic achievement in science. According to the authors, teacher consultation significantly contributed to students' performance in science.

Conclusion and Recommendation

The main purpose of this study is to evaluate the extent to which different study habit measure or subscales contribute to the academic achievement of science students in chemistry. From the findings of the study, it could be concluded that: (a) the students are, generally, practicing study habits that may be adjudged fair except in some areas like teacher consultation. This implies that teacher consultation is not a habit common amongst science students, even when they run into difficulties in the course of their studies; (b) Students' study habit significantly and positively contributes to students' academic achievement in chemistry; (c) Homework and assignment. as subscales or measures, of study habit significantly and negatively contributes to students' academic

achievement in chemistry. The nature of homework and the way students carry out the homework and assignment could be the reason for the negative contribution of study habit to students' achievement in chemistry. (c) While concentration contributes significantly to students' achievement in chemistry, teacher consultation, written work, study period procedure positively contributed but not significantly to students' achievement in chemistry. Based on the study findings, it was recommended that:

1. School guardian and counsellors should take time to support Chemistry students and indeed all science students to build their ability and skills to concentrate during study and classroom learning.
2. Training and guidance should be provided for teachers and students to enable them to enhance leaning through giving and doing homework and assignments in the right way.
3. Teachers should create the atmosphere that enable students develop the habit of frequently consultation with teachers in order to improve their mastery of concepts in chemistry.

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