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DIFFERENTIAL PREDICTION OF ACADEMIC ACHIEVEMENT BY COGNITIVE STRATEGIES AND ACHIEVEMENT GOALS AMONG UNDERGRADUATE STUDENTS IN BENUE STATE, NIGERIA

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ABSTRACT
This study investigated the differential prediction of academic achievement by cognitive strategies and achievement goals among undergraduate students in Benue State, Nigeria. Three hypotheses were tested and correlational survey research design was employed. The population of the study comprises of 8448 (300 level) undergraduate students in Benue. The sample size of the study is 365. Multi-stage sampling technique was used and 310 students responded and returned their questionnaires. Cognitive strategies questionnaire (CSQ), Achievement goals questionnaire-Revised (AGQ-R) and students' cumulative grade point average (CGPA) were used as instruments for data collection. The instruments were validated through face validity. For the reliability, Achievement Goals Questionnaire-Revised: mastery approach goals .775, mastery avoidance goals .909, performance approach goals .846 and performance avoidance goals .837. Cognitive Strategies: rehearsal strategies .800, elaboration strategies .837, organization strategies .825 and critical thinking strategies .839. Data were analyzed with multiple regression and independent sample t- test statistics. The findings of the study revealed that: there is significant differential prediction of academic achievement by cognitive strategies and achievement goals. Beta weights (β) for cognitive strategies is .925 and -.002 for achievement goals with cognitive strategies as a higher predictor. There is no significant difference in achievement goals (t=.105, p = 0.916) and cognitive strategies (t =.453, p = 0.651) of Arts and Science students. There is no significant gender difference in achievement goals (t = .898, p = 0.370) and cognitive strategies (t = .735, p = 0.463) of students. It was concluded that Cognitive strategies predict academic achievement of students better than achievement goals. It was recommended that students should be sensitized to utilize cognitive strategies to improve their academic achievement. Teachers should adopt cognitive oriented teaching strategies to improve academic achievement of students. Domains of cognitive strategies should be introduced in teachers' training curriculum.

Keywords: Cognitive strategies, Achievement goals, Academic achievement, Motivation, Undergraduate students and Benue state.

Introduction

There are indications that strong relationship exists between a societies' level of Education and positive socioeconomic development. Academic achievement is used to analyze the strength and weakness of educational system of a country. When students meet the standard set for them, there is a feeling of accomplishment and fulfillment by both students and their parents. But when students fail to attain standards set for them, it will affect the development of the societies and the institutions of learning negatively. Parents, teachers and society in general are much worried and apprehensive on how to improve academic achievement of students due to its importance. The negative effects of poor academic achievement on the students, the educational system, and the socio-economic development of the society cannot be over emphasized.

Olatunji, et al (2022) observed that stakeholders in Nigerian educational system ranging from; parents, guardians, lecturers, family members, counsellors, and many others, are so much concerned about students' academic achievement. Reason for this is probably because success in education is highly instrumental to the development of the Nation. The issue of poor academic achievement of students in Nigeria has therefore become a source of concern to all stakeholders involved in the delivery of quality education within the country. This unhealthy situation has led to the widely acclaimed fallen standard of education in Nigeria. These factors motivate researchers to investigate the causes of students' poor academic achievement in order to find a realistic solution to the problem using planned and professional educational methods.

Over the years, some researchers, example Alami (2019) have argued that students-related factors are the most important determinants of academic achievement of undergraduate students in the universities. He classified these factors into four macro categories such as: student-related factors (76.72%), teacher-related elements (5.40%), family-related causes (8.37%) and other factors like bad friends, marriage, having job, health problem, transportation problem and financial problem (9.49%). Cognitive strategies and achievement goals are some of the students-related factors that determine their academic achievement.

Cognitive strategies and achievement goals are found in literature to have contributed to students' academic achievement in many countries. The theoretical foundation of this study is built on Elliot et al (2019) framework. According to Elliot et al (2019), the hypothesis on the relationship between the achievement goals framework and cognitive strategies were generated on the basis of the existing literature and consideration of the motivation properties of each goal. Cognitive strategies refers to the various ways students processes their learning information. These strategies are rehearsal, elaboration, organization and critical thinking strategies. Achievement goals refers to students' purpose for participating in learning tasks. These goals are mastery approach, mastery avoidance, and performance approach and performance avoidance goals. For the purpose of this study, academic achievement is the learning outcome of undergraduate students measured by Cumulative Grade Point Average (CGPA).

Statement of the problem

The problem of poor academic achievement of undergraduate students is the focus of this study. There is a public outcry concerning the falling standard of education in Nigerian universities. However, the academic staff and quality assurance committee of these universities have proved that while some undergraduate students achieved high academically, so many others academic achievement is very low leading to their withdrawal from the universities. It has been observed by the researchers as lecturers in one of these universities that a good number of undergraduate students are failing to meet the standard set for them. There are indications that a

good number of undergraduate students' population have been withdrawn from these universities in recent time due to poor academic achievement and many of them are presently placed on probation for the same reason. There is a general concern about those undergraduate students that are on probation and those that have been withdrawn from the universities. This is because some of these students might be frustrated.

Therefore, there is a need to investigate academic achievement of these undergraduate students with the view of suggesting ways to enhance it because if this problem is left unchecked, it will continue to impact negatively on the society as well as putting the image of these universities into question. In view of this, a lot of attentions needed to be given to the phenomenon of academic achievement of the undergraduate students with the essence of making quick decisions that will improve it. As much as the problem of poor academic achievement of undergraduate students described here called for concern, it is not yet known why some undergraduate students in Benue state fail to attain the academic standards expected of them. Judging from the review of previous studies in literature, there are indications that sufficient research in the case of undergraduate students in Benue state on factors that affecting their academic achievement is inadequate. It is on this background that this study intends to fill the gap by investigating the differential prediction of academic achievement by cognitive strategies and achievement goals among undergraduate students in Benue state.

Hypotheses

The following hypotheses are formulated to guide the study

1. Cognitive strategies and achievement goals does not significantly predict academic achievement of undergraduate students with any differential predictive strength.
2. There is no significant difference in achievement goals and cognitive strategies of Arts and Science undergraduate students.
3. There is no significant gender difference in achievement goals and cognitive strategies of undergraduate students.

Review of related literature

Theoretical framework

The hypothesis on the relationship among the achievement goals framework, cognitive strategies and academic achievement were generated on the basis of the existing theoretical framework. This model was developed by Elliot et al (2019). The model of achievement goals, cognitive strategies and academic performance by Elliot et al (2019) is shown in Figure 1 below.

Achievement Goals → Cognitive strategies → Exam performance

This model suggested that achievement goals predict cognitive strategies and academic achievement of students.

Elliot's 2 X2 Model of Achievement Goals

Elliot in (2019) proposed further division of the theory of achievement goals into four groups including partitioning mastery goals into mastery-approach and mastery-avoidance goals and performance approach and performance avoidance goals. Elliot labeled the proposed four goal theory as the 2 x 2 achievement goals framework. In this framework individuals who are mastery-avoidance oriented are characterized as attempting to avoid failure, as defined as the perceived loss of competence or skill, according to mastery terms. That is, individuals who are mastery-avoidance oriented may be greatly concerned about losing what they have learned previously or becoming stagnant in their ability to perform a certain task.

In this framework, goal constructs are defined in two dimensions according to (a) definition of competence *(*performance versus mastery) and (b) valence of competence (approach versus avoidance). Accordingly, Elliot and McGregor (2019) proposed four constructs explaining students' goal orientations: performance-approach, performance-avoidance, mastery-approach, and mastery-avoidance. Performance-approach goals are defined in terms of normative standards where competence is positively valenced. Students with performance-approach goals give important to doing better than others or getting grades that are higher than their peers' grades. Likewise, performance-avoidance goal is defined in terms of normative standards but negatively valenced. Not getting lower grades than classmates or not failing in the exams are important for these students. The mastery-approach goal, on the other hand, is defined related to absolute or interpersonal standards and positively valenced. Mastery-approach goals include developing new skills or mastering new tasks. Finally, mastery-avoidance goals are also defined with respect to absolute or interpersonal standards and are negatively valenced.

Craik and Lockhart Levels or Depths of Processing Model (DPM)

The work of Craik and Lockhart in 1972 is labeled as the "levels of processing" theory represent a theoretical framework for cognitive strategies discussion in literature. The major proposition in their work is that learners utilize different levels of elaboration as they process information. This is done on a continuum from perception, through attention, to labeling, and finally, meaning. The key point is that all stimuli that activate a sensory receptor cell are permanently stored in memory, but that different levels of processing (i.e., elaboration) contribute to ability to access, or retrieve, that memory (Matseke 2020). According to him, this approach has been extended by Bransford who suggested that it is not only how the information is processed, but how the information is accessed. When the demands for accessing information more closely match the methods used to elaborate or learn the information, more is remembered.

Taylor (2022) identified four cognitive strategies learners employ to carry out an academic task. The strategies are: rehearsal, elaboration, organization and critical thinking. Rehearsal strategy includes methods for naming, repeating, and reciting material for learning. Elaboration strategy includes paraphrasing or summarizing learning material to help learners build internal connections between one's prior knowledge and the new material. Organization strategy includes methods of outlining, taking notes, mapping or connecting key ideas in learning material. Critical Thinking strategy includes conceptualizing, applying, synthesizing, and evaluating information to be learned.

Social Cognitive Theory by Albert Bandura

The social cognitive theory was proposed by Albert Bandura (1991) and it represents academic achievement framework in this study. Rooted in many basic concepts of traditional learning theory, Bandura believed that direct reinforcement could not account for all types of learning. Thus, Bandura was quoted by McGill et al (2018) to have said that: Learning would be exceedingly laborious, not to mention hazardous if people had to rely solely on the effects of their own actions to inform them what to do. Fortunately, most human behaviour is learned observationally through modelling: from observing others, one forms an idea of how new behaviours are performed, and on later occasions, this coded information serves as a guide for action**.**

McGill et al (2018) has stated that modelling, imitation, observational learning or social learning is used by various experts interchangeably to refer to the same thing. Thus they stated that modelling at times is referred to as imitative, observational learning or social learning. Bandura has stressed the importance of social and cognitive factor as well as the role of observational

models in determining behaviour as an opposition to Skinner's emphasis on environment as a determinant of organisms (or man's) behaviour. He represents behaviour as a function of the person and the environment called reciprocal determination. This interaction among person, behaviour and environment demonstrates how the world and the person cause each other. McGill et al (2018) thus argued that social learning theory states that people learn by watching others in social setting and modelling behaviour they think will lead to favourable outcomes, while avoiding behaviour they think may lead to punishing consequences.

Empirical Studies

Previous studies have established significant relationships among cognitive strategies, metacognitive strategies, achievement goals and academic achievement of students. Therefore, the objective of this study is to find out the differential prediction of cognitive strategies and achievement goals on the academic achievement on one hand, their difference on the course of study (Art and Science) and gender (male and female) of undergraduate students in Benue state. The previous study of Likko (2021) investigated differences in achievement goals, metacognitive awareness and academic success among students of colleges of education in north western Nigeria. 377 NCCIII students were sampled and used and Correlation survey was employed in the conduct of the study. Pearson product moment correlation, independent t-test, analysis of variance and regression analysis were the statistical tools used to analyze the data. Results of the analysis indicated that no mediation effect of gender on students' achievement goals ($t=1.213$, $p=0.226$) and academic success ($t=1.513$, $p=0.133$). It was also found that NCE Arts had more goal orientations ($t=2.243$, $p=0.026$) and academic success ($t=1.102$, $P=0.271$) than NCE science students.

Biyikli and Dogan (2020) study was conducted to determine whether there are differences between groups that summarize, using concept-map, prepare questions, telling to another person and those that do not use any learning strategies in regard to the effects of learning strategies used for rehearsal on the academic success of students. In this study, pretest, posttest controlled grouped experimental design was used. The study was performed on 135 grade 5 students and five teachers at Ankara Tevfik Fikret Primary School in 2010-2011 academic years. The data was collected from a multiple-choice test including 20 questions at the beginning and end of the experimental study. Results show that significant ($p<0.05$) difference was found between the pretest (34.27) and posttest (40.20) marks of experimental groups. In comparison of pre-test and post-test results of experimental group and control group, the increase in the marks of experimental group was statistically significant as compared to increase in the marks of control group. Furthermore, the highest increase was observed in the group that summarized (elaboration) and using concept-map (organization).

Kaptun, et al (2018) conducted a study with the purpose of establishing the relationship between learning strategies and student performance in physics. The objective of the study was to establish the relationship between self-directed strategies and student performance in physics in public secondary schools in Nakuru East Sub-County. The study was based on Structuralist Theory of Learning by Steffe and Gale (1995) and Social Cognitive Theory of Self-Regulation by Bandura (1986). The study adopted correlational design with mixed approaches where qualitative and quantitative data were concurrently analyzed and triangulated. Target population comprised principals, physics teachers and physics students. Students' sample was determined using Krejcie and Morgan (1990) at 95% confidence level and a sampling error of 5%. Purposive sampling was used for the principals and physics teachers. Research instruments comprised questionnaire, interview guide and document analysis guide in the form of performance blank. Cronbach alpha

reliability coefficient was computed to assess the internal consistency. The test yielded an overall reliability of r=0.85 based on standardized items. Data was analyzed using Statistical Package for Social Sciences (SPSS). The study revealed statistically significant differences in the mean performance of learners using different self-directed (cognitive) strategies. The study further established that self-directed (cognitive) strategies jointly accounted for 77.6% of variance in student performance in physics (R2 = 0. 776).

Nabizadeh, et al (2019) study was conducted to determine the ability of predicting academic achievement based on learning motivation strategies and outcome expectations based on a theoretical model. This descriptive-analytic study was conducted with the participation of 380 male and female students of nine faculties of medical sciences of Shahid Beheshti University of Tehran. Multi-stage sampling along with the questionnaire of motivational strategies for learning and student outcome expectation scale were used for data collection. The college grade point average (CGPA) of students' past grades was considered as the academic performance variable. Data analysis was performed using Structural Equation Modeling (SEM) in AMOS software. The mean score of the structure of learning strategies, motivational strategies, outcome expectations, and students' GPA did not show significant statistical differences in terms of gender, marital status, residence location, field of study, and educational level.

Ruffing et al (2021) study was aim at investigating gender differences in the incremental contribution of learning strategies over general cognitive ability in the prediction of academic achievement. The relationship between these variables was examined by correlation analyses. A set of t-tests was used to test for gender differences in learning strategies, whereas structural equation modeling as well as multi-group analyses was applied to investigate the incremental contribution of learning strategies for male and female students' academic performance. The sample consisted of 461 students (mean age = 21.2 years, SD = 3.2). Correlation analyses revealed that Gender differences were found in the reported application of many learning strategies rehearsal (female= 3.50, male =3.04), organization (female= 3.89, male =3.41), elaboration (female= 3.72, male =3.50) critical thinking (female= 2.81, male =3.06).

Methodology

This study employed correlational survey research design. The total population of this study is 8448 three hundred level undergraduate students in Benue state. The two universities where this study was conducted are; Federal University of Agriculture, Makurdi and Benue State University Makurdi. The sample size of the study is 365 as suggested by Research Advisors (2006). However, 310 participants responded and returned their questionnaires amounted to 15 percent (attrition) mortality rate. According to literature, there is no absolute standard for acceptable attrition levels; however bias is generally a concern if the rate exceeds 20% (Marcellus 2024).

Multi-stage sampling technique was used because of the large and diverse nature of the population covering different disciplines and courses of study. In the first stage, cluster sampling technique was used to cluster all the colleges/faculties from the two universities into 6 groups. Cluster sampling technique is used when the population is large and it is not feasible in terms of cost and time to test the whole clusters. This clustering was done based on the common features and characteristics of the population. The basis for clustering the groups is the interrelationship of the disciplines. The colleges/faculties that are related to each others are grouped (clustered) together.

The second stage involved the uses of simple random sampling technique to select one college/faculty each from each of the 6 groups (clusters). Simple random sampling was used to

provide equal chance for each subject of the population to be included in the sample. The third stage was to proportionately select number of participants from each college/faculty as determined by their number relative to the entire population with the use of proportionate sampling technique.

Two instruments were adapted and used for this study. The instruments are: Achievement Goals Questionnaire-Revised (AGQ-R) adapted from Elliot and Murayama (2020), and Cognitive strategies Questionnaire (CSQ) by Taylor (2022) reviewed from Motivated Strategies for Learning Questionnaires (MSLQ). Students' cumulative grade point average (CGPA) was obtained from the universities as a measure of academic achievement. The instruments were validated by Experts from the department of educational psychology and measurement/evaluation, Ahmadu Bello University Zaria. Corrections made on the number of items and scoring were effected and Pilot testing was conducted with undergraduate students from the faculty of social science, Benue State University Makurdi. Undergraduate Students from this faculty did not participate in this study but have similar characteristics with the population of the study. 40 copies of Achievement Goals Questionnaire-Revised and Cognitive Strategies Questionnaire were administered to undergraduate students from the faculty of social science and the internal consistency of the instruments was establishment. The data collected from pilot testing were analyzed using Cronbach's reliability. The results of Cronbach's Alpha reliability coefficient measuring internal consistency of Achievement Goals Questionnaire-Revised subscales include: mastery approach goals .775, mastery avoidance goals .909, performance approach goals .846 and performance avoidance goals .837. Similarly, the results of Cronbach's Alpha reliability coefficient measuring internal consistency of Cognitive Strategies Questionnaire are rehearsal strategies .800, elaboration strategies .837, organization strategies .825 and critical thinking strategies .839. The reliabilities coefficients show that the instruments are reliable to collect data for the research.

Result

Hypothesis one: Cognitive strategies and achievement goals does not significantly predict academic achievement of undergraduate students with any differential predictive strength.

Table 1: Multiple Regression statistics on differential prediction of cognitive strategies and achievement goals on academic achievement of undergraduate students

Variables	N	Mean	STD	Level of effect	R	R^2	Adjusted R^2	F	P value
Cognitive strategies	310	102.21	21.77	0.923**					
					0.923	0.852	.0.851	885.472	0.011
Achievement goals	310	104.19	22.61	0.854**					
Academic Achievement	310	2.80	0.60						

P value < 0.05, R, R^2 and Adjusted R^2 > 0.440, F computed > 3.000 F critical

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	.188	.064		2.922	.004
	Achievement_Goals	-5.588E-5	.002	-.002	-.036	.971
	Cognitive_Strategies	.026	.002	.925	15.959	.000

a. Dependent Variable: cgpa

The result of the Multiple Regression statistics in table 1 showed that there is significant differential prediction of academic achievement by cognitive strategies and achievement goals among undergraduate students. This is because the beta weights (β) for cognitive strategies is .925 and -.002 for achievement goals respectively. This implies that cognitive strategies and achievement goals differently predicts academic achievement of undergraduate students. Furthermore, the strength of cognitive is .925 is greater than that of achievement goals which is .002 and this indicates that cognitive strategies is a greater predictor of academic achievement than achievement goals. Also, the p-value of 0.011 is lower than the 0.05 alpha levels of significance and the computed F value 885.472 is greater than the 3.000 F critical. Therefore the null hypothesis which states Cognitive strategies and achievement goals does not significantly predict academic achievement of undergraduate students with any differential predictive strength is hereby rejected.

Hypothesis two: There is no significant difference in achievement goals and cognitive strategies of Arts and Science undergraduate students.

Table 2: Independent sample test statistics on difference in achievement goals and cognitive strategies of Arts and Science undergraduate students

Variables	Faculty	N	Mean	SD	Mean diff.	df	T	p value
Achievement goals	Arts	180	104.3056	23.35	.2748	308	.105	0.916
	Science	130	104.0308	21.62				
Cognitive strategies	Arts	180	101.7389	22.79184	1.138	308	.453	0.651
	Science	130	102.8769	20.36261				

The result of the independent sample t-test in table 2 showed that there is no significant difference in achievement goals and cognitive strategies of Arts and Science undergraduate students. This is because the p values of 0.916 and 0.651 for achievement goals and cognitive strategies is each greater than the 0.05 alpha level of significance. The means of achievement goals for Arts and Science students are 104.3056 and 104.0308, while the mean of cognitive strategies for Arts and Science students are 101.7389 and 102.8769 respectively. Therefore the null hypothesis which states that there is no significant difference in achievement goals and cognitive strategies of Arts and Science undergraduate students is hereby accepted and retained.

Hypothesis three: There is no significant difference in achievement goals and cognitive strategies of Male and Female undergraduate students.

Table 3: Independent sample test statistics on difference in achievement goals and cognitive strategies of Male and Female undergraduate students

Variables	Gender	N	Mean	SD	Mean diff.	df	T	P
Achievement goals	Male	145	105.4207	23.03972	2.31160	308	.898	0.370
	Female	165	103.1091	22.24284				
Cognitive strategies	Male	145	103.1862	22.63969	1.82257	308	.735	0.463
	Female	165	101.3636	21.02643				

The result of the independent sample t-test in table 3 showed that there is no significant gender difference in achievement goals and cognitive strategies of undergraduate students. This is because the p values of 0.370 and 0.463 for achievement goals and cognitive strategies is each greater than the 0.05 alpha level of significance. The means of achievement goals for male and female are 105.4207 and 103.1091, while the means of cognitive strategies for male and female are 103.1862 and 101.3636 respectively. Therefore the null hypothesis which states that there is no significant difference in achievement goals and cognitive strategies of Male and female undergraduate students is hereby accepted and retained.

Discussion of findings

The first finding of this study showed that there is significant differential prediction of academic achievement by cognitive strategies and achievement goals of undergraduate students. This is because the beta weights (β) for cognitive strategies which is .925is greater than -.002 for achievement goals. This means that cognitive strategies and achievement goals differently predicts academic achievement of undergraduate students. The findings of Biyikli and Dogan (2020) is in line with the first finding of this study. Their study showed that the differential prediction of cognitive strategies and achievement goals on academic achievement is significant in favour of cognitive strategies. This means that cognitive strategies are more effective than achievement goals in explaining the academic achievement of students. The results of these studies indicated that learning strategies such as cognitive strategies have had the most effects on academic achievement of school and university students in different courses. In general, they found that learning strategies, from each type (cognitive) in all studies (experimental, quasi-experimental, relational or correlational), in all learners (females and males) are very effective on the degree of their learning in different courses (experimental sciences, mathematics, and English Language).

Similarly, Biyikli and Dogan (2020) investigated the differences between groups that summarize, using concept-map, prepare questions, telling to another person and those that do not use any learning strategies in regard to the effects of learning strategies used for rehearsal on the academic success of students. Their findings showed a significant difference between the pretest and posttest marks of experimental groups and control groups. In comparison of pre-test and post-test results of experimental group and control group, the increase in the marks of experimental group was statistically significant as compared to increase in the marks of control group. Furthermore, the highest increase was observed in the group that summarized (elaboration) and using concept-map (organization). It implies that setting a goal alone is not enough to improve

academic achievement of students but deliberate actions such as the uses of cognitive strategies is more effective in improving academic achievement. These findings aligned with the theoretical framework of Elliot et al (2019) which showed that achievement goals and cognitive strategies are determinants of academic achievement as earlier mentioned in this study.

The second finding of this study showed that there is no significant difference in achievement goals and cognitive strategies of Arts and Science undergraduate students. The probability values of 0.916 and 0.651 for achievement goals and cognitive strategies is each greater than the 0.05 alpha level of significance. The means of achievement goals for Arts and Science students are 104.3056 and 104.0308, while the mean of cognitive strategies for Arts and Science students are 101.7389 and 102.8769 with 2748 and 1.138 as the mean differences. This finding does not agreed with earlier finding of Likko (2021) where it was found that NCE students in Arts had more goal orientations and academic success than NCE students in science. Since his method of analysis and statistical tool is the same with this study, it is likely that the differences in the level of participants might be responsible for these divergent findings. While his study was carried out on NCE students, this study was conducted on the undergraduate students. The undergraduate and NCE students operate in different learning environment and this might influence their achievement goal orientations as well as cognitive strategies. On the other hand, Kaptun et al (2018) findings showed statistically significant differences in the mean performance of learners using different self-directed strategies. The study further established that cognitive strategies jointly accounted for 77.6% of variance in students' performance in physics. These studies suggested that while Arts students appeared to have more achievement goals, science students are more likely to engage the uses of cognitive strategies. Many factors including the types of statistics could possibly be the reasons for these differences in the findings.

It was lastly found in hypothesis three of this study that no significant gender difference exists in achievement goals and cognitive strategies of undergraduate students. The probability values of 0.370 and 0.463 for achievement goals and cognitive strategies is each greater than the 0.05 alpha level of significance. The means of achievement goals for male and female are 105.4207 and 103.1091, while the means of cognitive strategies for male and female are 103.1862 and 101.3636 with 2.31160 and 1.82257 as mean the differences. The finding of Nabizadeh, et al (2019) supported the finding of this study. According to their findings, the mean score of the structure of learning strategies, motivational strategies, and students' GPA did not show significant statistical differences in terms of gender and field of study. But unlike their finding, Ruffing et al (2021) found gender difference in the application of many learning strategies. Female were found to have applied more of rehearsal, organization and elaboration strategies than male. In all the four cognitive strategies, it was only on critical thinking strategy that male students scored more than female students in application of cognitive strategies in that study. It is a common that male reflect on issues and tend to ask more questions than female but the difference in findings between their study and the finding of this study could be attributed to other factors such as research design, the population, sample and sampling technique as well as instruments for data collection and data analysis.

Conclusion

It was concluded in this study that cognitive strategies predicted academic achievement of undergraduate students more than the achievement goals. This implies that students who utilize cognitive strategies achieve more academically than those who utilize achievement goals. The broader implication of this finding to educational practice and for all the stakeholders in education is to adopt cognitive strategies training in their school curriculum in order to improve the academic

achievement of students. It was also concluded that there is no differences in achievement goals and cognitive strategies of Arts and Science undergraduate students and that there is no differences in achievement goals and cognitive strategies between male and female undergraduate students. This implies that no differences were found on the uses of achievement goals and cognitive strategies between Arts and Science students as well as between male and female students.

Recommendations

It was recommended in this study that:

1. Stakeholders in education should sensitize students through seminars and workshops to utilize cognitive strategies in order to improve their academic achievement.
2. Teachers should adopt cognitive oriented teaching strategies by practicing the domains of cognitive strategies during lessons to improve academic achievement of students.
3. Domains of cognitive strategies should be introduced by Government in teachers' training curriculum at all levels OF teacher education such as NCE, Bed and PGDE.

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