# GENDER AS PREDICTOR OF NIGERIAN PRESERVICE TEACHERS' MOTIVATION TO LEARN SCIENCE AND THEIR PERFORMANCE IN INTEGRATED SCIENCE

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**Abstract**

This study assessed science motivation in relation to gender and performance in integrated science among 200 preservice integrated science teachers from a college of education in the southwestern part of Nigeria using a descriptive survey design. Data collections in respect of motivation to learn integrated science and performance in integrated science were achieved using a standard questionnaire and the mean scores of five different year 1 courses (mathematics for integrated science, science education, scientific method, components of the environment and nature of matter) in integrated science obtained from the departmental record respectively. Data were analysed using correlation, t-test, multiple regression and ANOVA analyses at an alpha level of 0.05. The findings revealed that high motivation to learn integrated science recorded by the preservice teachers did not translate into their high performance in integrated science. In addition, there were significant effects of gender on the preservice teachers' intrinsically motivated science learning dimension of motivation to learn integrated science and performance in integrated science. Moreover, there was a significant effect of parental level of education on the preservice teachers' intrinsically motivated science learning dimension of motivation to learn integrated science but not on their performance in integrated science. Further, preservice teachers' mean performance in integrated science significantly and positively correlated with intrinsically motivated science learning, extrinsically motivated science learning, and confidence in learning science but not with self-determination for learning science and anxiety about science assessment dimensions of motivation to learn integrated science. Finally, gender ($\beta$=9.23, p=.0006) but not parental level of education ($\beta$=-3.09, p=.10) or total science motivation ($\beta$=.18, p=.08) was the only potent and significant contributor to the prediction of preservice teachers' performance in integrated science. It was therefore recommended that the curriculum development and teaching of integrated science at higher level of education should not only be gender-inclined but also gender-sensitive for enhanced students' performance.

**Keywords**: academic performance, gender, motivation, integrated science, preservice teachers.

## Introduction

One of the reasons it was most important to analyze factors affecting academic performance is because of its significant influence on academic motivation and use of them for increasing academic success. Consequently, learning and motivation are two variables for joint analysis. Academic performance is frequently defined in terms of examinations performance and was characterized by performance in tests, in course of examinations and performance of undergraduate students (Pintrich et.al, 2000).

It is believed that most of the students admitted are paid up by their parents. These students are from various schools background and their academic performances are assessed by use of tests, assignments, and examinations. Much as it is normal for students in an educational institution to perform excellently and others poorly, even after receiving the same basis.

In fact, one of the suggestions that best encompasses the complexity of motivational processes at the academic level comes from Pintrich and De Groot (2001), where they distinguished three general categories of relevant constructs for motivation in educational contexts: an expectation component, including students' beliefs about their ability to complete a task; a value component, including students' goals and beliefs about the task's importance and interest and an affective component, including affective-emotional consequences derived from completing a task, as well as the results of success or failure at an academic level. All these motivational beliefs have been related to self-regulate learning. Thus, various research papers claimed that students adopting an intrinsic motivational orientation use cognitive strategies and self-regulating processes to a greater degree than students who adopt an extrinsic motivational orientation (Pintrich& De Groot 2001).

Current research claims that students' active involvement in the learning process increases when they trust their own abilities and have high self-examined expectations, they valued the tasks and feel responsible for the learning objectives (Zimmerman, 2010).

Models and theories of motivation which emanates today not only highlight the cognitive determinant of motivation, but they also focus on the effects that certain contextual, personal variables have on cognitive and affective components of the motivational process.

Gender is one of the personal variables that have been related to differences found in motivational functioning and in self-regulated learning. Different research demonstrates the existence of different attribution patterns in boys and girls, such that while girls tend to give

more emphasis to effort when explaining their performance (Green, Nelson, Martin, & Marsh, 2006), boys appeal more to ability and luck as causes of their academic achievement. Regarding gender differences in academic self-concept, there is no evidence of such differences existing (Habibah, 2011), and when such differences do occur, it is to the detriment of the girls.

There have been renewed debates on the controversial issue of gender variations on science motivation and academic performance. This debate currently focuses on why men are not seeking careers in educational occupations. The most comprehensive review of the research in the area of gender variations have shown very few true differences between integrated science and verbal abilities between men and women. In fact, the research has shown only two gender differences in specific sub-areas of spatial and verbal abilities, three-dimensional mental rotation (favoring men), and speech production (favoring women). Other research has also shown a decline in the differences between the genders in the past few decades on standardized test, suggesting that the more exposure that women are getting to science classes, the better their scores. Although, this research puts into questions whether gender differences still exist in academic performance, as many researchers are still finding differences in performance as well as general interest in areas related to integrated science. Thus, performance alone cannot be the sole reason for men/women as they make their career choices. Even though women have made great strides in the law, medical, and social science professions, very few can be found in postgraduate programs or professions in mathematics, computer science, physics, engineering, or information technology jobs (Eccles, 2002). Many ideas have been put forth on why high achieving women may not be entering these professions including discrimination, gender-typed socialization, motivation, self-concept of ability in the areas, the value and interest that women have in these professions. The focus of this paper is to examine how the science motivation, parental education and gender relate to academic performance over time.

Motivation is one of the states that drives and sustains behaviors. For students to be motivated to learn in any discipline, they must participate in activities that are personally meaningful and worthwhile (Glynn&Koballa, 2006). By middle school, students' motivation to learn science is one of the most important predictors of science course success (Britner&Pajares, 2008). No practicing teacher at any level doubts the importance of motivation to learners. In this, motivation is seen as an inner state or force that energizes, directs and sustains behavior towards performance or achievement of a goal. It is a nebulous

psychological construct which cannot be directly observed but, as with attitudes, inferred from overt behavior of the learner (Reid, 2006).

Motivation in education is very difficult to measure. This is partly because motivation to learn is very difficult to describe operationally. The key to measuring motivation must be to look for behaviors indicating high motivation and low motivation. However, most approaches have relied on self-report and this can only measure what respondents think about themselves and may or may not reflect reality (Danili and Reid, 2004). Motivational orientation, defined as intrinsic or extrinsic motivation, explains how rewards affect students' engagement with particular learning activities (Eccles&Wigfield, 2002). Intrinsic motivation refers to performance of a task rewarded by completing the task itself, whereas extrinsic motivation refers to performance of a task in order to receive an external reward (Covington, 2001; Martin & Nelson, 2006). Ryan and Deci (2006) stated that "intrinsically motivated activities provide satisfaction of innate psychological needs". When intrinsically motivated, students engage in an activity because the task itself is interesting or they feel rewarded by completing the task. In academic situations, intrinsic motivation leads to deeper processing, greater mastery and better implementation of learning strategies (Ahmed et.al, 2013). Intrinsically motivated students are also more likely to persist with challenging tasks and other positive classroom behaviors as well as perform better academically (Areola, 2012). Marsh (2006) sees intrinsic motivation as the inbuilt tendency to connect the interests of individuals to the development and use of the capacities of individuals. Thus, when learning is satisfying and meaningful, when what is learned is perceived to be of value by the learner and when there is confidence and purpose, then motivation will be intrinsic, bringing considerable benefits (Deci and Ryan, 2006). Indeed, intrinsic motivation may well allow learners to see their learning as meaningful, and of value and benefit, whether the learning tasks are attractive or not (Marsh et al., 2006; Ames, 1992).

Extrinsic motivation generally drives behavior when students complete tasks for an external outcome (Wilson et al., 2006). When rewards are given to students for completing tasks that they were once intrinsically motivated to complete, their motivational orientation shifted from intrinsic to extrinsic. If students are rewarded for participating in an intrinsically motivated task, they may begin to think that a reward is a necessity to complete certain task not persisting unless the reward is present. It has also been suggested that if rewards are given in a competitive environment, ie., to the best or clever students are rewarded for the wrong reasons (Covington et al, 2001).

Although, early research concluded that extrinsic motivation was detrimental to intrinsic motivation and performance. More recent research suggested that extrinsic motivation is more complex. Ranging on a continuum from passive compliance to active personal commitment, extrinsic motivation depends on whether a student wants to avoid a negative consequence or sees value in the outcome that may be obtained (Ames, 1992). As people mature in school and working environments, more external rewards are offered. It is sometimes difficult to separate motivational orientation as many learning activities have extrinsic rewards attached to them (Ryan &Deci, 2006). Extrinsically motivated students who fall closer to active personal commitment on the continuum may be driven to act primarily because of the reward. However, these rewards may also have some intrinsic elements, (e.g. receiving an 'A' makes the student feel good).

Self-determination focuses on the degree to which an individual's behavior is self-motivated and self-determined. SDT identifies three innate needs that, if satisfied, allow optimal function and growth ie competence, relatedness, and autonomy. According to Deci, (2006), these three psychological needs motivate self to initiate specific behavior and mental nutriments that are essential for psychological health and well-being. When these needs are satisfied, there are positive consequences, such as well-being and growth, leading people to be motivated, productive and happy. When they are thwarted, people's motivation, productivity and happiness plummet.

The present study assessed science motivation in relation to gender and academic performance in integrated science. The following research questions were addressed:

1. What is the level of motivation to learn integrated science among pre-service teachers?
2. What is the effect of gender on preservice teachers' motivation to learn integrated science?
3. What is the effect of parental level of education on preservice teachers' motivation to learn integrated science and performance in integrated science?
4. What is the relationship among dimensions of motivation (intrinsic motivation, extrinsic motivation, self-determination learning, confidence in learning and anxiety assessment) to learn integrated science of preservice teachers?

5. What are the joint and relative contributions of motivation to learn integrated science, gender, and parental level of education to the explanation of variance in preservice teachers' performance in integrated science?

## Methodology

### Research Design

In this study a descriptive survey was designed for the research.

### Variables of the Study

Total motivation to learn science was taken as the predictor (independent) variables, while performance in integrated science was used as the criterion (dependent) variables. The dimensions of motivation to learn science (intrinsic motivation, extrinsic motivation, self-determination for learning science, confidence in learning science and anxiety about science assessment) were correlated against performance in integrated science.

### Population

Population consisted of all preservice teachers studying towards a 3-year National Certificate in Education (NCE) programme in integrated science in a College of Education in South-west, Nigeria.

### Sample and Sampling Techniques

Descriptive survey sampling was used to select the participants who were full-time students from the study area. The objective was to choose a group of participants who possess the characteristics of the population of interest so that the study results can be generalized. The

sampling design was used in this study to increase the reliability of the survey estimates for obtaining samples that are unbiased and representative of the target population.

The sample size for this study was 200 participants selected from the population of the study**.**

**Instruments**

Science Motivation Questionnaire (Glynn and Koballa, 2006) which contained five dimensions and a 5-point Likert scale which allows for Never, Rarely, Sometimes, Often, and Always responses from respondents and scores on the entire scale that could range from 25 to 125 with middle point being 75 was used in this study because it could be administered to larger numbers of respondents concurrently, with uniform instructions and explanations. The respondents were to complete the questionnaire in a confidential setting, therefore diminishing possible bias connected to researcher presence, and devoid of instant time constraints. Also, pre-service teachers' performance scores integrated science obtained with permission from departmental records was used for this study.

**Reliability of the Instrument**

A Cronbach alpha coefficient was calculated for the science motivation questionnaire to show how reliable the instrument was. The internal consistency of the SMQ was computed as 0.91.

**Procedure for Data Collection**

The researcher approached the Head of Department (HOD) of integrated science education in the College of Education explaining the purpose of the research after which the researcher was allowed with the support of a Lecturer in integrated science to administer the questionnaire to the respondents concerned. A validated semi-structured questionnaire containing two sections A and B was used to obtain information on demographic characteristics and other information relating to the research questions respectively. The students were told that their participation in the study was voluntary and that they were free

to withdraw from participating in the study at any stage. A 100 percent response rate was recorded in the study.

**Data Analysis**

Data were analyzed using mean rating, standard deviation, Pearson Moment correlation of coefficient (PMCC), multiple linear regression, t-test and analysis of Variance. Statistical analysis software (SAS), version 9.10.Inc. was used for completing the analyses, in which respondents' bio-data analysis used Mean and standard deviation statistical tools, while, PMCC and multiple linear regressions were used for data analysis at 0.05 level of significance. The decision criterion in favor or against the research questions was based on the analysis results of the data gathered from the research field.

**Results**

**Research Question One:** What is the level of motivation to learn integrated science among preservice teachers?

Table 1. *Descriptive statistics and reliability coefficient for motivation to learn integrated science dimensions and pre-service teachers' integrated science score (n=200)*

| Sub-scale | No of items | Mean | SD | Alpha |
|---|---|---|---|---|
| IMT | 5 | 16.83 | 3.13 | .88 |
| EMT | 5 | 17.32 | 2.76 | .81 |
| SDT | 5 | 16.72 | 3.15 | .79 |
| CLT | 5 | 17.26 | 3.08 | .92 |
| AAT | 5 | 13.12 | 4.55 | .85 |
| Integrated Science | 50 | 48.12 | 18.16 | |

*Note:* **IMT**= Intrinsically Motivated Science Learning Total, **EMT** = Extrinsically Motivated Science Learning Total; **SDT** = Self-Determination for Learning Science Total; **CLT** =

Confidence in Learning Science Total; **AAT** = Anxiety about Science Assessment Total; **Int.science** = Integrated science.

**Table 1** showed that the highest score that could be obtained from the motivation to learn integrated science questionnaire was 125 while the least score was 25. Hence, the motivation score ranged from 25 to 150 and as such the median score was put at 75. Any score above the median score is categorized as high whereas any score below the median score is categorized as low. Score within the median is moderate. In this study, a mean score of 81.30 with confidence limit that ranged from 79.59 to 82.95 was obtained indicating that the pre-service teachers showed a high level of motivation to learn integrated science.

The mean score of the participants on the intrinsically motivated sub-scale was (M=16.83, SD=3.13), extrinsically motivated sub-scale (M=17.32, SD=2.76), self-determination sub-scale (M=16.72, SD=3.15), confidence in learning science sub-scale (M=17.26, SD=3.08), and anxiety assessment sub-scale (M=13.12, SD=4.55).

A large proportion of the pre-service teachers performed low in integrated science. In short, the overall M=48.12, SD=18.16, at 95% CI=44.58 - 50.65 for the entire sample showed low performance in integrated science.

**Research Question Two**: What is the effect of gender on pre-service teachers' motivation to learn integrated science and performance in integrated science?

Table 2: *Motivation Variable Classified According to the Gender of the Students*

| **Variable** | **Male (N = 61** | **Female (N = 138)** | ***t-value*** | ***p-value*** |
|---|---|---|---|---|
| | Mean ± SD | Mean ± SD | | |
| IMT | 16.51 ± 2.81 | 17.00 ± 3.27 | -2.73 | 0.0063 |
| EMT | 17.27 ± 2.08 | 17.33 ± 3.03 | -1.51 | 0.1308 |
| SDT | 16.67 ± 2.77 | 16.75 ± 3.33 | -0.99 | 0.3291 |
| CLT | 17.79 ± 2.35 | 17.18 ± 3.37 | -0.71 | 0.4776 |
| AAT | 14.02 ± 4.09 | 12.75 ± 4.72 | 1.39 | 0.1641 |
| TSM | 81.96 ± 9.51 | 81.01 ± 13.03 | -0.45 | 0.6501 |
| Integrated Science | 42.10 ± 20.98 | 51.10 ± 15.81 | -2.37 | 0.0177 |

*Note.* **IMT** = Intrinsically Motivated Science Learning Total, **EMT** = Extrinsic MotivatedScience Learning Total; **SDT** = Self Determination for Learning Science Total; **CLT** = Confidence in Learning Science Total; **AAT** = Anxiety about Science Assessment Total; **NCE** = National certificate of Education.

**Table 2** summarizes means and standard deviations of gender in relation to preservice teachers' motivation to learn integrated science scores and performance in integrated science scores. The table showed that there were significant effects of gender on the preservice teachers' intrinsically motivated science learning dimension of motivation to learn integrated science scores and performance in integrated science scores. However, the table showed no significant effects of gender on the pre-service teachers' other dimensions (EMT, SDT, CLT and AAT) of motivation to learn integrated science.

**Research Question Three:** What is the effect of parental level of education on preservice teachers' motivation to learn integrated science and performance in integrated science?

**Table 3:** ***Motivation Variables Classified According to the Parental Levels of Education***

| Variable | <Higher Education (N = 61) | Higher Education (N = 138) | *t-value* | *p-value* |
|---|---|---|---|---|
| | Mean ± SD | Mean ± SD | | |
| **IMT** | 17.46 ± 2.92 | 16.52 ± 3.21 | 2.11 | 0.0341 |
| **EMT** | 17.71 ± 2.70 | 17.12 ± 2.80 | 1.33 | 0.1810 |
| **SDT** | 17.25 ± 2.91 | 16.50 ± 3.30 | 0.26 | 0.7897 |
| **CLT** | 17.65 ± 3.10 | 17.10 ± 3.10 | 1.76 | 0.0775 |
| **AAT** | 12.10 ± 3.93 | 13.30 ± 4.90 | -0.37 | 0.7076 |
| **TSM** | 83.03 ± 11.60 | 80.43 ± 12.22 | 1.09 | 0.2735 |
| **Integrated Science** | 50.60 ± 14.90 | 21.15 ± 1.80 | 0.30 | 0.7633 |

*Note.* **IMT** = Intrinsically Motivated Science Learning Total, EMT = Extrinsic Motivated Science Learning Total; **SDT** = Self Determination for Learning Science Total; **CLT** = Confidence in Learning Science Total; **AAT** = Anxiety about Science Assessment Total; **NCE** = National certificate of Education.

**Table 3** summarizes means and standard deviations of parental level of education in relation to preservice teachers' motivation to learn integrated science scores and performance in integrated science scores. The table showed that there were no significant effects of parental level of education on pre-service teachers' in all the variables, but only in intrinsically motivated learning dimension(s) of motivation to learn integrated science and academic performance in integrated science scores.

**Research Question Four:** What is the relationship among dimensions of motivation to learn science (intrinsic motivation, extrinsic motivation, self-determination learning, confidence in learning, and anxiety assessment) of preservice teachers?

**Table 4** ***Correlations Matrix for the Relationship between Preservice Teachers' Motivation to Learn Science and their Academic Performance Score in Integrated Science***

| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| **1. Integrated Science** | 1.00 | 0.009 | 0.043 | 0.128* | 0.029 | 0.740* |
| **2. IMT** | | 1.00 | 0.537* | 0.510* | 0.497* | 0.113* |
| **3. EMT** | | | 1.00 | 0.625* | 0.544* | 0.266* |
| **4. SDT** | | | | 1.00 | 0.593* | 0.362* |
| **5. CLT** | | | | | 1.00 | 0.764* |
| **6. AAT** | | | | | | 1.00 |

*P<0.05

The results in **Table 4** above showed the relationship among the motivation to learn integrated science and preservice teachers' academic performance in integrated science. The outcome of the Pearson product moment correlation analysis indicated that pre-service teachers' integrated science scores significantly and positively correlated with intrinsic motivation, extrinsic motivation, and confidence in science learning dimensions of motivation, but not significantly correlated with self-determination in learning motivation and anxiety assessment dimension of motivation to learn integrated science.

**Research Question Five:** What are the combined and relative contributions of motivation to learn integrated science, gender, and parental level of education to the explanation of variance in preservice teachers' academic performance in integrated science?

**Table 5** *Model Summary, Coefficient and t-value of Multiple Linear Regression Analysis of Motivation to Learning integrated Science and the Outcome Measure (Academic performance in integrated science)*

| **Model Summary** | | | | |
|---|---|---|---|---|
| Multiple $R^2$= 0.1228<br>Multiple $R^2$ (Adjusted)=0.007<br><br>*F*= 6.03/197, *p*<0.0006 | | | | |
| **Model** | **B** | **Std Error** | ***T*** | **Sig** |
| MQT | 0.18 | 0.102 | 1.74 | 0.084 |
| GEN | 9.23 | 2.661 | 3.47 | 0.0006 |
| PEDU | -3.09 | 1.880 | -1.64 | 0.1026 |

The results in **Table 5** above showed that independent variables (parental level of education (PEDU), gender (GEN), and total motivation to learn integrated science (MQT) jointly contributed a coefficient of multiple regression of 0.1228 and an adjusted multiple correlation square of 0.007 to the prediction of preservice teachers' academic performance in integrated science. By implication, 12.28% of the total variance of the dependent variable was accounted for by the combination of the three independent variables. The results further revealed that the analysis of variance of multiple linear regression data produced an *F*-ratio value significant at 0.001.

The results of the relative contributions of the independent variables to the explanation of variance in preservice teachers' academic performance in integrated science indicated that only gender contributed positively to the explanation of variance in preservice teachers' academic performance in integrated science ($\beta$ =9.23, $t$ =3.47, $p$<.0006). Notably, this shows that at higher education, gender is heterogeneous and highly significant.

**Discussion**

The finding on the first research question revealed a high level of motivation to learn integrated science with a large proportion of preservice teachers having low or average scores in their academic performance. This was observed when most students reported they were motivated to study science not only because they thought it would be helpful for a career, but also because they "found it relevant to their health, life and understanding of the world". When students found science courses were relevant to their careers, both their motivation and science GPA will be higher (Glynn, Taasoobshirazi, & Brickman, 2007). Another study found that when college students reported lower motivation in science courses their performances will be lower as well (Glynn et al., 2009). There are many motivational constructs that could relate to academic success in college science. However, researchers have identified intrinsic and extrinsic motivation, goal orientation, confidence in learning, self-determination, and assessment anxiety as important constructs for science learning (Glynn &Koballa, 2006; Glynn et al., 2009).

Examination scores is the measurement in differentiating students' level of knowledge for them to go further in their studies, gaining scholarship and obtaining better results (Habibah 2011). Students then depend on higher institution ability to provide them with the best courses as pathway to their future success that will develop best skills and knowledge during their working life. However, it was the student attitude towards their study that will be one criterion to make differences in their academic performance.

Also, observation shows that students may be highly motivated and still have low academic performance, that is why it is believed that learning styles do play its own role on academic performance, and however small the effect on learning outcomes, it is accepted that learning styles can help students enhance their own learning and thus encourage self-directed learning. No wonder Lee (2010) emphasized why it is necessary for students and educational institutions to understand learning styles, and since some students have preferences for the ways they learn or understand a subject, it is advisable to tailor these styles to suit their own learning needs which will help motivation presented to them have meaning in their academic life, by so doing improving their academic performance.

It is also true that most students may be well motivated to learn, but may be derailed along the way through different factors like Psychological (stress, low rate of assimilation), parental influence/ family background, not doing course of interest, environmental factor etc. All these can lead to lower performance in their academic life.

Second result revealed a significant effect of gender on the pre-service teachers' intrinsically motivated to learn integrated science and their performance in integrated science. This findings was however supported by the study of (Gabelko, 2014), who stated that regarding gender differences in academic self-concept, there is no evidence of such differences existing. This means that intrinsic motivation among college students is sensitive to many factors regardless of their gender, which include (enjoyment, life relevance and career benefits), and socio-economic factors (parental level of educations). These factors significantly predicted students' academic performance status and gender influence.

This finding also corroborates (Reid et al, 2004) who opined that students who are intrinsically motivated are more likely to engage in the task willingly as well as work to improve their skills, which will increase their capabilities and must participate in activities that are personally meaningful and worthwhile. It is also revealed that male or female student adopting an intrinsic motivational orientation use cognitive strategies and self-regulating processes to a greater degree than any gender who adopt an extrinsic motivational orientation (Pintrich& De Groot, 2001).

However, when student (male or female) trust their own abilities and have high self-efficacy expectations; they value the tasks and feel responsible for the learning objectives.

The findings on the third research question revealed that there was a significant effect of parental level of education on pre-service teachers' intrinsically motivated science learning dimension of motivation to learn integrated science, but not on their performance in integrated science scores. This is in line with Meece et al; (2010) who stated that intrinsic motivators include parental expectations, expectations of other trusted role models, earning potential to enroll in a course later and good grades.

Parents with lower levels of education are less likely to have high expectations for the children's academic performance. So, when parents do not have high expectations for children's academic performance, the children are unlikely to have expectations too. That is why only intrinsically motivated students that are aware with their parents' comfort

educational level will reflect remarkably in their grades or academic performance. This is well noted in the fact that some parents are guiding their wards to have the same career with them which may be in contrary to the wish of the student, and by so doing having negative impact on his/her academic performance. It also happens when parents want their ward to read a particular course which they have potential for without considering the potentials of the child, by so doing affecting the student's performance.

Likewise in this study, the results showed that parental level of education does not have much effect on students' academic performance, but on individual student exhibiting their own attitude to learn not minding their parents' level of education. Additionally, higher students do not form a homogenous group and one measure of education advantage may not suit all groups equally.

Fourth research question findings revealed that Intrinsic motivation, Extrinsic motivation and confidence in learning motivation to learn integrated science all correlated positively and significantly with the pre-service teachers' academic performance in integrated science, but not significantly correlated with self-determination in learning motivation and anxiety assessment dimension of motivation to learn integrated science. This implies that science motivation among integrated students is sensitive to much confidence in learning factors such as degree of performance, mastering knowledge and grade "A" influence. It also means that, science motivation among integrated science students is a function of extrinsic factors (grade, reward and career). It then leads credence to integrated science education aiming at cultivating students to foresee future career, discover potential opportunities ahead, understand grade demand, plan and implement science related projects. The result also shows that those students with higher GPA scores are associated with higher intrinsic motivation, which is supported by Lee et al; (2010) which showed students that were more inclined towards intrinsic motivation to learn gain knowledge and achieve things towards academic excellence. Also, results revealed that extrinsic motivation to learn have a significant relationship with academic performance (r =0.043) which then showed that students have perception regarding how they want their student life in college to become from future aspect i.e better teaching job, in support with Covington et al., (2001) who opined that extrinsic motivation generally drives behaviors when students complete tasks for an external outcome, or when rewards were given to students for completing tasks that they were once intrinsically motivated to complete, their motivation orientation shifted from intrinsic to extrinsic (Deci&Ryan, 2006). Confidence in learning (r =0.029) likewise have

effect on academic performance and this showed significant trend of students' confidence in upholding their obligation to divert any pressure or difficult task given to them during their studies as future teachers. Consequently, student with high confidence level can succeed in examinations which in this case has similar goal from previous studies done by Habibah et al (2011) where they found that confidence in learning plays a big part producing academic excellences.

While, there were no significant effect of self-determination and anxiety about assessment in learning dimension of motivation, meaning that science motivation among integrated science students is less sensitive to various psychological factors and this finding agrees with previous studies reporting that one of the suggestion that best encompasses the complexity of motivational processes at the academic level comes from Pintrich and De Groot (2001), where they distinguish three general categories of relevant constructs for motivation in educational contexts: an expectation component, including students' beliefs about their ability to complete a task; a value component, including students' goals and beliefs about the task's importance and interest, and an affective component, including affective-emotional consequences derived from completing a task, as well as the results of success or failure at an academic level.

All these motivational beliefs have been related to self-regulate learning. Findings is plausible as it is difficult to impose ideas in which individuals lack interest, feels incapable of and sees self as someone who can never do it well. Therefore, to foster science motivation of students, science educators must stimulate students' interest in integrated science, promote their self-efficacy and help them to build positive self-concept regarding science. This present finding supports Edward and Richard M. Ryan (2000) who conducted research that eventually led to the proposition of the self-determination theory (SDT) that focused on the degree to which an individual's behavior is self-motivated and self-determined. SDT identifies three innate needs that, if satisfied, allow optimal function and growth: competence, relatedness, and autonomy. According to Deci, (2006), these three psychological needs motivate the self to initiate specific behavior and mental nutriments that are essential for psychological health and well-being. When these needs are satisfied, there are positive consequences, such as well-being and growth, leading people to be motivated, productive and happy. When they are thwarted, people's motivation, productivity and happiness plummet. The anxiety factors such as, continuous assessment test, reward, are other potent predictors of

the academic performance of integrated science education students which did not have significant effect on the pre-service performance.

Fifth findings is that only gender of students learning integrated science not parental level of education, or total science motivation was the potent and significant contributor to the prediction of pre-service teachers' performance in integrated science. This is in line with what have been discussed before that no matter how students are being motivated, or despite the level of their parents' education, these cannot be a determinant of students' academic performance but only depend on the students themselves whether male or female. Remarkably, this shows that at higher education, gender is heterogeneous and highly significant. This finding agrees with the report of (Eccles&Wigfield, 2002; Greene & Martin, 2006) who posited that gender differences in the motivation to learn science has attracted much attention during the last decade. Evidence accumulated thus far on gender differences in motivation is inconclusive.

While many studies (Lau, Chan, & Wong, 2012; Meece& Jones, 2010) reported that there are gender differences in extrinsic and intrinsic motivation between male and female students, study by Glynn et al. (2009) reported otherwise. In terms of gender, a significant difference was found between boys and girls in assessment anxiety while other motivational orientations were comparable between the two groups. Girls were more anxious than boys on assessment and this finding concurred with those studies carried out elsewhere (Glynn et al., 2009; Danili et. al., 2004; Meece & Jones, 2010). However, Haist et al (2000) showed that men performed better than women in certain settings, while women outperformed men in other settings.

Moreover, educational statistics have indicated that female students are outperforming their male counterparts at all levels of the education system and attaining higher qualifications.It is therefore noted in this findings that female pre-service teachers with their large effect size did better with their natural interest to learn than their male counterparts, and according to Wilson et at; (2006) which attributed this partly to females students being more academically responsible and thus less likely to be absent from class works.

**Summary of Findings**

The following summary is made of the major findings based on the data analysis of this study:

- A substantial number of students showed a high level of motivation to learn integrated science, with the large proportion of pre-service teachers having low scores on the performance examinations.
- There is significant effect of gender on preservice teachers' intrinsically motivated dimension of motivation to learn integrated science scores and performance in integrated science scores.
- No significant effects of parental level of education on preservice teachers' extrinsic motivated science learning, self-determination for learning, confidence in learning, and anxiety assessment dimensions of motivation to learn integrated science. However, there is a significant effect of parental level of education on preservice teachers' intrinsically motivated science learning dimension of motivation to learn integrated science but not on their academic performance in integrated science.
- Only intrinsically motivated, extrinsically motivated, confidence in learning but not self-determination and anxiety in science assessment dimensions of motivation to learn integrated science correlated positively and significantly with preservice teachers' academic performance in integrated science.
- Results of research question five from the regression analysis indicated that only the gender, not parental level of education or total science motivation, significantly contributed to the explanation of variance in preservice teachers' academic performance in integrated science.

**Conclusions**

The present study has provided meaningful insight into the influence of science motivation in relation to gender as predictors of preservice teachers' integrated science academic performance. The findings also established the major impact of intrinsic, extrinsic, self-determination, confidence in learning, anxiety and parental level of education status as influential factors of students' science motivation.

Besides, the findings submitted that academic performance could only be improved by gender through self-conviction and motivation as a result of eliminating poor performance, and also observed that students' motivation for self-reliance could reduce or eliminate joblessness and also reduce crime through effective engagement of integrated science students and other science related discipline graduates in the society.

The importance of gender influence as a panacea or predictors to preservice teachers' integrated science academic performance cannot be over emphasized. As such, it is the responsibility of all stakeholders in this study, consisting of the government, non-government agencies, international development partners, parents, communities, teachers, school management, wealthy individuals and the organized private sectors to see science students in our colleges these days are properly nurtured through their academic performance in preparation for their future career and effective role in the society.

Also from the study, it was deduced that gender played an important role on student's academic performance, just because student who was able to be involved in science through integrated science education could as well take decision personally irrespective of gender. Despite the facts that gender differences in science performance have narrowed, research suggests that domain-specific values and competence beliefs may mediate gender differences in performance behaviors and course choices. (Eccles, Wigfield, et al., 2002), noted that the trend toward increasing differences between boys' and girls' science self-concept and values should not be disregarded. Notably, Educators should devote time and effort to not just improve male and female students' science performance but also to developing their beliefs. With the above, the total science motivation factors and parental levels of education will influence students' academic performance.

## 5.3 Recommendations

From the findings of this study, the following recommendations were made, for policy formulations and implementations;

i. Efforts should be made to increase students' desirability for integrated science education through intrinsic value, extrinsic value, self-determination, confidence in learning and anxiety.
ii. It was therefore recommended that the curriculum development and teaching of integrated science at higher level of education should not only be gender-inclined but also gender-sensitive for enhanced students' performance.

iii. Government should as much as possible provide necessary tools and equipment needed in science laboratories in all institutions at all times in order to enhance growth and developments.

iv. Various training, seminars, conferences and orientation should be organized by the stakeholders in order to acquaint students on the fact that gender cannot hinder students' science motivation.

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