RELATIONSHIP BETWEEN SELF-EFFICACY AND ACADEMIC PERFORMANCE IN CHEMISTRY AMONG PRE-NCE STUDENTS OF ISA KAITA COLLEGE OF EDUCATION DUTSIN-MA, KATSINA STATE

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Abstract

This study investigated the relationship between self-efficacy and academic performance in chemistry among Pre-NCE students of Isa Kaita College of Education Dutsinma. Two research questions were raised and two null hypotheses were tested at 0.05 level of significance. The population of the study comprised of 2017/2018 Pre-NCE Chemistry students. A sample of 205 students was selected using proportionate random sampling technique, and was chosen using Krejcie and Morgan (1970) table for determining sample size from a given population. One instrument and a data were used for the purpose of the research, viz Chemistry Self-efficacy Instrument (CSI) and First semester Pre-NCE results of chemistry students. The validity of the instrument was determined by experts in Science Education and Educational Psychology and the reliability coefficient was determined using test re-test, and was found to be 0.74. Two variables were compared and analyzed using Pearson Product Moment Correlation (PPMC). The results of the analysis revealed that there was no significant relationship between students’ self-efficacy and performance in chemistry. It was recommended that science teachers should guide their students toward developing self-efficacy in science by encouraging students to take on more challenging tasks and a greater interest in science.

Keywords: Self-efficacy, academic performance, chemistry, students

Introduction

Social cognitive theory, students’ beliefs about their capabilities to successfully perform academic tasks, or self-efficacy, are strong predictors of their capability to accomplish such tasks. Bandura observed that because individual interpret the results of their experiences, the influences of powerful determinants of academic performances such as knowledge, skills or the results of prior attainments on subsequent performance is mediated by the beliefs that result from such interpretation. Students self-efficacy help determine what students will do with the knowledge and skills they possess. Self-efficacy act as determinant of behavior by influencing the choice that individual make, the effort they expand, the perseverance they exert in the face of difficulties, and the thought patterns and emotional reaction they
experiences. It is for these reasons that high self-efficacy is likely to promote stronger academic performances whereas low self-efficacy is likely to undetermined them.

Self-efficacy refers to subjective judgments of one’s capabilities to organize and execute courses of action to attain designated goals (Baudura, 1997). It is a belief about what a person could do rather than personal judgment about one’s physical or personality attributes. According to Bandura (1997) four sources of information contribute to the development of an individual’s self-efficacy belief; they are enactive mastery experience, vicarious experience, verbal or social persuasion, physiological and emotional state. Information from these sources does not directly influence an individual’s self-efficacy, it is an individual’s interpretation of the information that results in an increase or decrease in self-efficacy.

Self-efficacy theory is an important component of Bandura’s social cognitive theory which suggests high inter-relationship among individual’s behavior, environment and cognitive factors. According to Bandura (1993) self-efficacy affects an individual in all aspect of life including educational experiences. The higher the perceived efficacy the higher the goals and aspirations people adopt and the firmer the commitment to achieving those goals. An important assumption of social cognitive theory is that personal determinant such as forethought and self-reflection do not have to reside unconsciously within individuals, people can consciously charge and develop the cognitive functioning. Self-efficacy beliefs therefore determine how people feel, think, motivate and behave. Such beliefs produce and enhance human accomplishment and personal well being of individuals. People with high assurance in their capabilities approach difficult tasks as challenges to master rather than as threats to be avoided. Such an efficacious outlook fosters intrinsic interest and deep engrossment in activities. In contrasts people who doubt their capabilities shy away from difficult tasks, which they view as personal threats. They slacken their efforts and give up easily in the face of difficulties. They view insufficient performance as deficient aptitude; it does not require much failure for them to lose faith in their capabilities. They fall easy victims to stress and depression, (Bandura, 1994).

Bandura (1997) wrote that, experience is essentially what individual choose to attend to. If this is the case, then the self beliefs that influence those choices are instrumental in defining one’s experience and providing an avenue through which individuals exercise control over events that affect their lives. This study therefore, intends to see if there is a correlation between self efficacy and academic performance in Chemistry among pre-NCE students.

Gender barrier within the educational system is an existing issue, and science classrooms are not an exception. Gender is a widely investigated issue in science Education. Many researchers have reported that, there are longer distinguishing differences in the cognitive, affective and psychomotor skills performance of individuals in respect of gender (Arigbabu & Miji, 2009; Bilesanmi & Awoderu, 2010). Other researchers have reported differently on the issue. Scientific discourses are perceived to be more suitable for boys; while girls separate themselves from sciences, particularly physical sciences and engineering as they matured. This study therefore aimed at investigating if the relationship between self-efficacy and performance in Chemistry is gender related and the relationship between reasoning ability and performance in chemistry is gender related.
Statement of the Problem
Over the years researches in science education revealed that students generally perform poorly in science subject (Usman, 2012). Factors responsible for poor performance in science education are poor knowledge of mathematic (Azuka, 2010), poor understanding of abstract concepts in science subject (Ndioho, 2007), students negative attitude toward science subjects (Awosiyan, 2006). Lack of well equipped science laboratories, unqualified science teachers and lack of seminars and workshops on science related courses by teachers were reported by Obomanu (2011). Within the last two decades much has been written on the difficulties students of varying age face, coping with certain scientific concepts. Such studies have revealed that among other factors is inability to exercise strong self-efficacy (Astudilo & Naiz, 1996; Huddle & Pillary, 1996).

Similarly, Schunk and Milla, (2002) established that students with positive self-efficacy would perform well in natural sciences. They went further to established that this positive self-efficacy would motivate students to do better in more difficult task than the ones they are used to. They therefore, were able to establish a significant relationship between self-efficacy and performance in science. The researcher has also observed that most Pre NCE Science students found it difficult to pass chemistry courses. Based on these findings and observation made by the researcher, this study was conceived, to investigate the relationship between self-efficacy and academic performance in chemistry and finally to examine if self-efficacy and academic performance in chemistry are gender related among Pre-NCE students of Isa Kaita College of Education Dutsin-Ma.

Objectives of the Study
The objectives of the study were to:
1. Investigate the relationship between students’ self-efficacy and academic performance in chemistry
2. To find out the relationship between male and female students’ self-efficacy in chemistry.

Research Questions
This study answered the following research questions:
1. Is there any relationship between students’ self-efficacy and their academic performance in chemistry?
2. Is there any relationship between male and female students’ self-efficacy in chemistry?

Research Hypotheses
The following null hypotheses were formulated and tested at 0.05 alpha level of significance.
1. There is no significant relationship between students’ self-efficacy and academic performance in Chemistry.
2. There is no significant relationship between male and female students’ self-efficacy in Chemistry.

Methodology
The study investigated the relationship between self-efficacy and academic performance in chemistry among Pre-NCE students of Isa Kaita College of Education, Dutsin-Ma Katsina State. The design used in this study was descriptive survey research of correlation type. The justification for using the design
was to find the relationship between variables under study which are self efficacy and academic performance.

The population of the study consists of all 2017/2018 academic session of pre-NCE students with chemistry course combination at Isa Kaita College of Education, Dutsin-Ma. The population of the students is four hundred and forty two (442). Out of which one hundred and twelve were female (112) and three hundred and thirty (330) were male students. Proportionate random sampling technique was used to select a sample of 205 subjects out of the population of 442 pre-NCE chemistry students. The researchers adopted the technique because of inequality in the population. The sample was made up of 55 female students and 150 male students of 2017/2018 session. The sample was chosen using Krejcie and Morgan (1970) table for determination sample size for a given population which says that if the population of research ranges from 440-459, a sample of 205 should be used.

The instruments used for the study were Chemistry self-efficacy instrument (CSI) and First Semester 2017/2018 pre-NCE Chemistry results of Isa Kaita College of Education (IKCOE) Dutsinma. Chemistry self-efficacy instrument (CSI) was adapted from Baldwin, Ebert, May and Burns. The instrument contains fifteen (15) statements about students’ confidence in doing things related to chemistry, it was designed to assess students’ chemistry self-efficacy. The instrument has original reliability of 0.83. Twelve items were adapted with items answered on a five point Likert scale from 100% confident, 75% confident, 50% confident, 25% confident and 0% confident respectively.

The instrument was validated by a panel of three experts. One educational psychologist and two science educators, the educational psychologist is from Bayero University Kano, the Science Educators are from Umar Musa Yar’adua University, Katsina who critically observed it, check it appropriateness and comprehensiveness and finally adjudged that, it has content and construct validity. The reliability of the CSI was established using test-retest reliability. The instrument was pilot tested at FCE, Katsina using 50 pre-NCE students of chemistry. The result was correlated using Pearson Product Moment Correlation. The index found is 0.79 which is high enough for the instrument to be reliable.

Results of 205 Pre-NCE chemistry students for the first semester 2017/2018 were used as the second instrument. The validity of the result was determined by the institution. The questions, scripts and scores were all moderated by authorities. The data collected from the field were used to answer research questions and test hypotheses. Research questions were answered using descriptive statistics, hypotheses were analyzed using Pearson product moment correlation formula. The chemistry self-efficacy instrument were graded into five point Likert scale that is 100% confidence, 75% confidence, 50% confidence, 25% confidence and 0% confidence.

**Results**

The result contains descriptive and inferential statistical tests. For the purpose of data collection, Chemistry self-efficacy instrument (CSI) was used to measure students’ self efficacy. Students’ first semester chemistry results 2017/2018 were used as their academic performance in chemistry. The two variables were compared. Three research questions were answered using descriptive statistics and two null hypotheses were tested using Pearson Product Moment Correlation at 0.05 level of significant.
Research Question 1: Is there any relationship between students’ self-efficacy and their academic performance in Chemistry?

In answering the above question, the mean self-efficacy of the students was compared with the mean academic performance of the students. It was found that the mean self-efficacy of the students was 64.20 and that of academic performance was 43.95. Therefore, there is no relationship between students’ self-efficacy and their academic performance chemistry, because the self-efficacy score is higher than that of their performance scores.

Table 1: Relationship between students’ self-efficacy and their academic performance

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Efficacy</td>
<td>202</td>
<td>64.20</td>
</tr>
<tr>
<td>Academic Performance</td>
<td>202</td>
<td>43.95</td>
</tr>
</tbody>
</table>

Research Question 2: Is there any relationship between female students’ self-efficacy and their academic performance in chemistry?

In answering the above question, the mean score of female students’ self-efficacy and that of their academic performance were compared. It was found that the mean score of female students’ self-efficacy was 69.09 while that of their academic performance was 37.53. This showed that there is no relationship between female students’ self-efficacy and their academic performance in chemistry, because female students’ self-efficacy score is higher than that of their performance score.

Table 2: Relationship relationship female students’ self-efficacy and their academic performance

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Efficacy</td>
<td>55</td>
<td>69.09</td>
</tr>
<tr>
<td>Academic Performance</td>
<td>55</td>
<td>37.53</td>
</tr>
</tbody>
</table>

Hypotheses Testing

The researcher tested two null hypotheses. The hypotheses were analyzed using Pearson Product Moment Correlation.

Hypothesis One: There is no significant relationship between students’ self-efficacy and their academic performance in chemistry.

This hypothesis was tested by subjecting the students’ self-efficacy scores and that of their academic performance to Pearson analysis and was presented in table 3.

Table 3: Relationship between students’ self-efficacy and their academic performance

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>r-Cal</th>
<th>p-Value</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-efficacy</td>
<td>202</td>
<td>64.18</td>
<td>22.19</td>
<td>.096</td>
<td>.173</td>
<td>Not significant</td>
</tr>
<tr>
<td>Academic Performance</td>
<td>202</td>
<td>43.95</td>
<td>16.84</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
From the result of table 3, the relationship between students’ self-efficacy and academic performance though positively related were not significant, Pearson’s $r$ (200) = .096, $p = .173$. This indicates no significant relationship between students’ self-efficacy and academic performance because the p-value is more than the .05 level of significance. Therefore, $H_01$ which states that there is no significant relationship between students’ self-efficacy and their academic performance in chemistry was accepted.

**Hypothesis Two**: There is no significant relationship between male and female students’ self-efficacy. This hypothesis was tested by subjecting the male and female students’ self-efficacy scores to a Pearson analysis and was presented in Table 4.

**Table 4: Relationship between male and female students’ self-efficacy.**

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>r-Cal</th>
<th>p-Value</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>147</td>
<td>62.35</td>
<td>24.23</td>
<td>-0.094</td>
<td>.497</td>
<td>Not significant</td>
</tr>
<tr>
<td>Female</td>
<td>55</td>
<td>69.09</td>
<td>14.54</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From the result of Table 4, male and female students’ self-efficacy were negatively related and not significant, Pearson’s $r$ (200) = -.094, $p = .497$. This indicates no significant relationship between male and female students’ self-efficacy because the p-value is more than the .05 level of significance. Therefore, $H_02$ which states that there is no significant relationship between male and female students’ self-efficacy was accepted.

**Discussion of Findings**

From the result in table 1, students’ self-efficacy and academic performance though positively related were not significant. This indicates no significant relationship between student’s self-efficacy and academic performance. This finding is in line with Britner (2002) who carried out investigation on science self-efficacy of American middle school students. His result revealed that self-efficacy did not make an independent contribution to the prediction of science laboratory grade neither for boys nor for girls. It also agreed with Diane (2013) who worked on the relationship between, gender, age and academic achievement and discovered that most students had moderate to high level self-efficacy, but no significant relationship was found between them.

Abdu (2008) found that there is a significant relationship between students’ self-efficacy and their academic achievement in chemistry. The present result also contradicts Salame (2007) who also found a positive significant relationship between self-efficacy and academic performance in science. Result in table 3 revealed that male and female students’ self-efficacy and their academic performance though negatively related were not significant. This indicates no significant relationship between male students’ self-efficacy and their academic performance.

The findings agreed with that of Britner and Pajares (2001) who reported higher science self-efficacy among middle school girls than middle school boys. The result also rhymed with that of Britner (2002) who revealed that self-efficacy did not make an independent contribution to the perception of science laboratory grade neither for boys nor for girls. However, the present result contradicted that of Abdu (2008) who found that there was significant relationship between male self-efficacy and academic
performance in Chemistry. It also contradicted the findings of Debackner and Nelson (2013) who reported that male students tend to be more confident when responding to self-efficacy instrument.

**Conclusion**
The research questions were concerned with whether or not there is a significant relationship among students’ self-efficacy and academic performance in chemistry. The answers to these questions were obtained by the analysis of the students’ chemistry first semesters’ result 2017/2018. These lead to the following conclusion:

1. Students’ self-efficacy has no relationship with the performance in chemistry. Therefore is not a predictor of their performance.
2. There is no significant relationship between male and female students’ self-efficacy and their academic performance. Therefore, male and female students’ self-efficacy is not a predictor of their performance in chemistry.
3. On a general note, self-efficacy, is not related to students’ academic performance and cannot be used to predict the students’ academic performance in chemistry.

**Recommendations**
Based on the finding of this study the following recommendations were made:

1. It was observed that self-efficacy did not correlate with students’ performance in chemistry. Therefore science teachers should guide their students toward developing positive self-efficacy.
2. There is need for teachers and school administrators to introduce and use instructional strategies and interactions that would build self-confidence.

**References**


