

MEDIATING EFFECT OF MOTIVATION ON THE RELATIONSHIP OF FEAR OF FAILURE AND LEARNING OUTCOME OF GRADE 8 STUDENTS IN CHEMISTRY

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<https://doi.org/10.37602/IJREHC.2023.4508>

ABSTRACT

The study was conducted to determine the mediating effect of motivation on the relationship between fear of failure and learning outcome of Grade 8 students in Chemistry. It utilized the quantitative, non-experimental method, specifically the descriptive and correlational designs. The respondents were the 250 Grade 8 students in the five public secondary schools in Monkayo, Davao de Oro enrolled in S.Y. 2020-2021. A stratified random sampling technique was used to identify the respondents. Two sets of adapted survey questionnaires and a unified summative test in Chemistry were used as research instruments. The statistical tools used were mean, Pearson r, and Sobel z Test. Findings of the study showed that fear of failure is highly evident among students ($M=3.51$; $DS=0.93$). Students' motivation is also highly evident ($M=3.77$; $DS=0.71$). However, the learning outcome in Chemistry is very low ($M=35.59$; $DS=1076$). Correlational analysis revealed that the relationship between fear of failure and learning outcome in Chemistry ($r = 0.055$; $p = 0.383$) and motivation and learning outcome ($r = -0.031$; $p = 0.622$) is not statistically significant. On the other hand, fear of failure and motivation ($r = 0.306$; $p=0.000$) has a weak, positive, and statistically significant relationship. Thus, mediation analysis was not performed in the study due to the failure of other variables to establish a relationship. Findings are indicative that Chemistry teachers may conduct a needs analysis to identify the least learned competencies of students in Chemistry. They may also develop diverse and well-rounded classroom or school activities that will address students' fear of failure, and enhance their motivation towards learning Chemistry.

Keywords. Science education, fear of failure, motivation, learning outcome, Chemistry, Grade 8

1.0 INTRODUCTION

Students' motivation and learning outcome in Chemistry have declined over the years (Akram et al., 2017). Consequently, most of the secondary school students consider Chemistry as challenging and complicated, which affect their interest in learning the subject (Sausan, 2018). In this connection, significant confusion happens when students attempt to understand scientific and chemical explanations inside their pre-instructional content structure (Treagust et al., 2018). More so, Kaleva et al. (2019) revealed that the deterioration of students' interest in Chemistry is because they find it an irrelevant and uninteresting subject which is why their motivation and learning outcomes are greatly affected.

In the global scenario, severe problems in the learning outcome of students in Chemistry have been observed. Based on Tilahun and Tirfu's (2016) study, students in Ebanat, Ethiopia failed their Chemistry university entrance examinations from 2012-2015 because they had trouble understanding chemical analysis, reaction, equilibrium, and other competencies in Chemistry. Similarly, students in Indonesia and Thailand obtained consistently poor Science literacy results based on the data of Programmed for International Student Assessment (PISA) from 2009-2018 (Khidhir, 2018).

Moreover, out of the 79 participating countries, the Philippines ranked 78th in Science based on the PISA result in 2018 (PISA 2018 Data, 2020). The Philippines garnered a 357-average point in Science compared to the 489-point average score of the OECD. Thus, the mean score of 15-year-old Filipino students is under Proficiency Level 1a compared to students from OECD countries at Proficiency Level 3.

In the Municipality of Monkayo, Davao de Oro an Anecdotes from teachers and school heads accounted for the students' National Achievement Test (NAT) average in elementary and secondary schools is consistently low relative to other subject areas and municipalities in the region since 2013. NAT measures students' competence in English, Mathematics, Science, Filipino, and Araling Panlipunan. Among these learning areas, students obtained the lowest score in Science. Based on the NAT results, Grade 6 and 10 students obtained an average score of 41.5% in 2015, 44.7% in 2016, and 44.1% in 2017 (Businessworld, 2019). These mean percentage scores are significantly lower than the 75% achievement goal of the Department of Education.

Anchored on the contexts above, the researcher has not run into any research that extend across the potential of motivation in moderating the relationship between students' fear of failure and learning outcome in Chemistry in five secondary schools in Monkayo District. Although there were existing studies on students' learning outcome in Chemistry, there was limited research on its relationship with motivation and fear of failure. Additionally, studying the mediating effect of motivation on fear of failure and learning outcome in Chemistry in the new normal is a whole different scenario.

In the new normal, this study may provide a better understanding of the mediating effect of motivation on the relationship of fear of failure and learning outcome of Grade 8 students in Chemistry. Besides, the researcher, who is a classroom teacher, is particularly interested in examining affective variables that may significantly relate to students' learning outcome in Chemistry. Similarly, Tuan et al. (2005) emphasized that motivation and fear of failure are decisive factors in theoretical modification procedures, critical thinking, learning approaches, and Science academic accomplishment. Convinced with the situations cited in the previous paragraphs, the researcher was prompted to conduct this research study to explore the mediating effect of motivation on the relationship between fear of failure and learning outcome in Chemistry. It is hoped that this study's findings will contribute in the improvement of the learning outcomes of students in science.

2.0 METHOD

This study is a quantitative type of research that utilized the descriptive and correlational approach with mediation analysis. Apuke (2017) defined quantitative research as a method of

analyzing results through the use of numerical data to provide answers to queries like who, what, when, where, how, how much, and how many in explaining a phenomenon. This design is appropriate for this study since numerical data were gathered and statistically analyzed to establish the proposed relationships among the variables involved in the study.

Descriptive research was used to describe the characteristics of the populace being studied. According to Manjunatha (2019), descriptive research primarily focuses on answering the “what” of the phenomenon rather than the “why.” The said author further explained that this type of research aims to describe, explain, and validate the numerical result of the study rather than identify the root causes of the occurrence. In this study, descriptive research was utilized to identify the level of fear of failure, motivation, and learning outcome of the Grade 8 students in Chemistry.

Moreover, in order to identify the mediating effect of motivation on the relationship between fear of failure and learning outcome of the Grade 8 students in Chemistry, the researcher employed correlational approach. According to Curtis, Comiskey, and Dempsey (2016), the purpose of correlational approach is to determine relationships between two or more variables in the same population. The use of correlational approach was applied in this research since it studied the relationship between the variables fear of failure and learning outcome, motivation and learning outcome, and fear of failure and motivation. Overall, this study aims to determine the mediating effect of motivation on the relationship of fear of failure and learning outcome of Grade 8 students in Chemistry in Monkayo, Davao de Oro for the S.Y. 2020-2021. In addition, the data were collected using two adopted survey questionnaires and a unified summative test in Chemistry.

The respondents of this study were the bona fide Grade 8 students in S.Y. 2020- 2021 in five different public secondary schools in Monkayo, Davao de Oro, namely: School A, School B, School C, School D, and School E. There was a total of 551 Grade 8 students in the targeted schools. Using the Raosoft sample size calculator with a 5% marginal error and a 95% confidence level resulting to the sample size of 227 respondents. However, to address the possible outliers and missing data, the researcher had 250 respondents in this study.

Furthermore, a stratified random sampling technique was utilized to identify the respondents from the five public secondary schools in Monkayo, Davao de Oro. Stratified random sampling is a means of getting a sample size from a large population. With this, the sample size was evenly distributed into subgroups (Frey, 2018). In this study, the 250 Grade 8 students were divided into strata based on their schools. The sample size per school or strata was determined proportionally to the population per school. Then, using Microsoft Excel, random numbers were assigned to the students for random selection.

3.0 RESULTS AND DISCUSSION

1. Level of Students’ Fear of Failure. The level of students’ fear of failure in Chemistry. The table shows that among the mean results in this indicator, the highest falls to “fear of upsetting important others” which is 3.69 with a descriptive equivalent of high. Meaning to say, the condition of fear of failure in this indicator is highly evident. Conversely, the lowest falls to “fear of important others losing interest” which is 3.37 described as moderate. That is to say, the circumstance of fear of failure in this level is evident. More so, the category mean of

students' fear of failure is 3.51 with a descriptive equivalent of high. Meaning, the fear of failure among the Grade 8 students in Chemistry is highly evident. Meanwhile, an SD of 0.93 with a mean of 3.51 with a descriptive equivalent of moderate, indicating that the data points are somewhat spread out around the mean. This indicates that there is a moderate amount of variability or dispersion among the data points. Hence, it is expected that there is a wider distribution of data points around the mean compared to a smaller standard deviation. Specifically, in this case most of the data points fall within the range of 2.58 to 4.44. Thus, this implies that the level of students' fear of failure in Chemistry is between low to very high level. This further signifies that the students' fear of failure in the important others losing interest is highly evident as they learn Chemistry.

The above finding is supported by Chuang et al. (2022) that described fear of failure as the inclination to assess problems in an assessment context when failure is imminent. Likewise, Deneault's et al. (2020) study emphasized that students' high fear of failure is deeply rooted in their early childhood with their experiences with their family members, especially with their parents and then with other important people.

In education, Nakhla (2019) cited that people have high respect and great affection for scholastically inclined students. As a consequence, they try to avoid failure for fear to experience humiliation, judgment, and discrimination from their peers, teachers, and loved ones. Failure is a manifestation of being not good enough. All of these will lead to students' hostile perceptions towards themselves.

Indicators	Mean	SD	Descriptive Equivalent
Fear of Experiencing Shame and Embarrassment	3.54	0.90	High
Fear of Devaluing One's Self-Esteem	3.48	0.83	High
Fear of Having Uncertain Future	3.44	0.99	High
Fear of Important Others Losing Interest	3.37	0.91	Moderate
Fear of Upsetting Important Others	3.69	0.97	High
Category Mean	3.51	0.93	High

Moreover, Holic (2018) accentuated that fear of failure is a tool for assessing students' ability to face, deal with, and accept failures. It stems from the students' fear of disappointing important people in their lives. Finally, it can also be a factor that prevents them from reaching their full potential.

2. Level of Students' Motivation. The level of the students' motivation in terms of self-efficacy, active learning strategies, Science value, performance goal, achievement goal, and learning environmental stimulation. The results reveal that the indicator "achievement goal"

has the highest mean of 4.05 with a descriptive equivalent of high. Meaning to say, the condition of motivation in this indicator is highly evident. Whereas, the indicator “self-efficacy” has the lowest mean of 3.52 which is also described as high. In other words, the condition of motivation in this indicator is also highly evident. Meanwhile, the category mean of the level of students’ motivation is 3.77 with a descriptive equivalent of high. In detail, the five indicators are described to be at high level. This implies that the students’ motivation such as self-efficacy, active learning, Science value, performance goal, achievement goal and learning environment stimulation are highly evident as they engage in learning Chemistry. The data also revealed that the dispersion of the students’ motivation has an SD of 0.71. The standard deviation of 0.71 with a mean score of 3.77 indicates that the data values are tightly clustered around the mean score and that there is relatively low variability or dispersion among the data points. To be more specific, most of the data points to be within the range of 3.06 to 4.48. This implies that students have manifested the indicated behavior between averages to very high levels.

The finding of this study conforms to the proposition of Chan and Norlizah (2018) that motivation is a self-directed force towards learning. The said study presented an emphasis on the importance of self-efficacy, active learning strategies, science value, performance goal, achievement goal, and learning environment stimulation in the students’ academic achievement in Science. Accordingly, when students are highly motivated, they are more likely exhibit more desire and effort to accomplish their learning tasks. Thus, in school, it is essential to employ strategies that will ignite students’ motivation in learning.

Indicators	Mean	SD	Descriptive Equivalent
Self-Efficacy	3.52	0.78	High
Active Learning Strategies	3.69	0.65	High
Science Value	3.98	0.68	High
Performance Goal	3.78	0.65	High
Achievement Goal	4.05	0.63	High
Learning Environment Stimulation	3.77	0.70	High
Category mean	3.77	0.71	High

Moreover, the findings presented above are consistent with Macula and Damoni (2020) that motivation is an important factor that drives students in completing a certain task. Likewise, the same authors mentioned in their study that among the indicators of motivation, achievement goal plays the most important drive to students who tend to be more active in reaching their achievement goals rather than focusing on the science content and their performance task.

3. Level of Students’ Learning Outcome in Chemistry. The level of students’ learning outcome in Chemistry. The overall mean score of 35.59 with the transmuted grade of 74 with

a descriptive equivalent of did not meet expectations. Meaning to say, the students' learning outcome in Chemistry is poor. Whereas, the dispersion value of the indicated learning outcome is 10.76. This means that the Grade 8 students' learning outcome is close to the average scores and is more likely close to the mean.

The results showed that the students' learning outcome in Chemistry is below their expected level. In other words, the students fail the test and they are still having trouble with understanding the concepts in Chemistry. It further indicates that they lack the necessary competencies and performance standards in Chemistry. Their level has not yet reached the set standards of the said learning area.

Mean Score	SD	Transmuted Grade	Descriptive Equivalent
35.59	10.76	74	Did Not Meet Expectations

The data is in consonance with Ambag (2018) that the Philippines' educational system in teaching Science is "not at strength". This is shown in the National Achievement Test (NAT) in Science wherein secondary students obtained 46.38% in 2010, 40.53% in 2012, and 36.91% in 2019. This is far behind the Department of Education's (DepEd) target mean percentage score of 75%.

Furthermore, several studies in the Philippines confirmed that students faced various challenges in understanding science concepts, especially in Chemistry. Orbe et al. (2018) revealed that students' poor learning outcome is considered a teacher's factor. They argue that in the K to 12 curriculum, teachers are required to teach all the science subjects in spiral progression approach.

Besides, Dunton and Co (2019) uncovered other contributory factors towards students' poor learning outcome in Chemistry. First, teaching guide and learning modules were not yet received by the teachers. Second, the program implementation is not well-planned. Third, there is a lack of qualified Chemistry teachers. Fourth, the teachers have insufficient seminars to update their knowledge. Lastly, teachers' trainings are insufficient.

4. Relationship between Fear of Failure and Learning Outcome; Fear of Failure and Motivation; and Motivation and Learning Outcome in Chemistry. The relationship between fear of failure and learning outcome; fear of failure and motivation; and motivation and learning outcome in Chemistry which were tested through the use of the Pearson r correlation. As displayed in the table, the relationship between fear of failure and learning outcome in Chemistry is not statistically significant ($p > 0.5$) with a negligible correlation ($r = 0.055$). This means that the null hypothesis is hereby accepted.

On the contrary, the data presents that the relationship between fear of failure and motivation is significant ($p < 0.5$) with a low positive correlation ($r = 0.306$). This implies that the null hypothesis is rejected. Furthermore, on the test of relationship between motivation and learning outcome, the result shows no statistical significance ($p > 0.5$) with a low negative correlation ($r = -0.031$). This signifies that the null hypothesis is accepted. Therefore, it can be determined that there is no significant relationship between students' motivation and learning outcome among the Grade 8 students.

Variables Correlated	R	p-value	Decision on Ho	Decision on Relationship
Fear of Failure and Learning Outcome in Chemistry	0.055	0.383	Accept	Not Significant
Fear of Failure and Motivation	0.306	0.000	Reject	Significant
Motivation and Learning Outcome	-0.031	0.622	Accept	Not Significant

The finding supports the study of Clark et al. (2014) that motivation has no direct and positive relationship with the development of students’ learning outcome. Although motivation is thought to be significant in encouraging learners to pursue good learning outcomes, it is indirectly related to students’ grade point average. Likewise, their study revealed that students who love learning are most likely enjoy the advantages of having good intellectual capabilities.

5. Mediating Effect of Students’ Motivation on the Relationship between Students’ Fear of Failure and Students’ Learning Outcomes in Chemistry. The analysis was done to determine if the students’ motivation has a mediating effect on the relationship between the two variables; fear of failure and learning outcome. With the use of regression method, the data were analyzed and interpreted.

There are three conditions to be satisfied in a mediation. Based on step one, the result shows that fear of failure (independent variable) is not a significant predictor of learning outcome in Chemistry. The data reveal that fear of failure does significantly predict the learning outcomes of the students in Chemistry ($p=0.383$) since the p-value is greater than the margin of error set at 5%.

Independent Variable	Dependent Variable	Fear of Failure	Learning Outcome	Motivation
Mediating Variable				
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Step 1. Path C (IV and DV)	Unstandardized Beta	0.821		
(B) Standard Error (e)		0.940		
p-value		0.383		
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Step 2. Path B (MV and DV)	Unstandardized Beta	-0.779		
(B) Standard Error (e)		1.577		
p-value		0.622		
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Step 3. Path A (IV and MV)	Unstandardized Beta	0.182		
(B) Standard Error (e)		0.036		
p-value		0.000		
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Step 4. Combined Influence of IV and MV on DV	Unstandardized Beta	0.988		
Fear of Failure (B) Standard Error (e)		0.072		
Standardized Beta		0.042		
Part Correlation Learning Outcome	Standardized Beta	0.049		
Beta Part Correlation Total R-square		1.655		
		0.021		
		0.117		

This result supports that of Anoit et al. (2020) who discovered that fear of failure does not strongly affect students' learning outcome in Science subjects. Although, fear of failure could be a factor, yet such relationship is not highly significant. Consequently, such influence is negative on students' performance and motivation to learn Science. The aforementioned authors explained that fear of failure impacts differently to students. While others try to avoid fear of failure by doing better in their Science subject, some do not exert more effort to justify their poor learning outcome.

On the other hand, step two shows that the mediating variable, motivation, is also not a significant predictor of learning outcome ($p=0.622$) since the p-value is greater than the 5% margin of error. This finding negates the study of Schumacher and Astleitner (2018) that stressed out the contributory factor of motivation to the students' learning outcome. It has been found out that motivation results in better understanding and retention of key concepts in any field of study, specifically on Chemistry.

Meanwhile, step A revealed that only the path between the variable fear of failure and students' motivation is significant ($p=0.000$). This is verified by the computed p-value of 0.000 which is lesser than the significance value of 0.05. The said result implies that level of students' fear of failure can determine their level of motivation. Students with high fear of failure consequently can also affect their motivation as they learn Chemistry. Chuang et al. (2022) agreed on this finding, citing motivation as being affected by the indicators of fear of failure. As previously stated, the higher the fear of failure of the students, the greater their motivation. This is because the motivational changes occur in a person as they develop self-awareness such as being afraid to fail.

Step four shows the combined influence of fear of failure and motivation on learning outcome in Science. The overall analysis of the data reveals that the results disagreed to Baron and Kenny's (1986) standards since preconditions before conducting mediation analysis were not satisfied. Therefore, additional mediation analysis to further assess the significance of the mediation effect was not applied to the variables since only one of the three paths is significant.

The finding failed to reject the null hypothesis stating that motivation does not significantly mediate the relationship between fear of failure and learning outcome. This result confirms Anoit et al.'s (2020) assumptions that fear of failure and learning outcome are not positively related.

3.0 CONCLUSION

Based on the aforementioned findings, the derived conclusions are presented below:

1. The students' fear of failure in Chemistry was found to be highly evident.
2. The students' motivation in Chemistry was found to be highly evident.
3. The students' learning outcome in Chemistry did not meet expectations.
4. Fear of failure and learning outcome in Chemistry showed no significant relationship. Motivation and learning outcome in Chemistry also had no significant relationship. However, fear of failure and motivation showed statistically significant relationship.
5. Motivation does not significantly mediate the relationship between fear of failure and learning outcome in Chemistry.

5.0 RECOMMENDATION

Based on the findings and conclusion derived in this study, the following recommendations are summarized: Students are highly encouraged to make use of the self-learning modules and learners' materials to equip themselves with the necessary competencies in Science. In this way, they will overcome their fear of failure and heighten their motivation to reach their desired learning outcome. Science teachers may conduct needs analysis to identify the least learned competencies of students in Science. They may also develop diverse and authentic classroom and school activities that will present Science concepts that will relate to the students' daily lives. Consequently, it will help address students' fear of failure and enhance their motivation and learning outcome in Science. Science supervisors may provide additional instructional materials and facilities that would help learners enhance their learning outcome in Chemistry. Moreover, they may conduct more training for upgrading and upskilling the teachers who are handling Science subjects. School administrators are highly encouraged to create and implement intervention plan focusing on addressing students' fear of failure. Such plan would include individual and small group counseling to help them lessen their fear of failure. Curriculum makers may also need to devise learning approach program that will look into students' development of learning outcome in Chemistry. It is necessary to provide students with more opportunities to explore Science concepts through a curriculum design that is significant to their life experiences.

Lastly, it is highly suggested that additional researches be conducted to address others contributory factors that affect the students' learning outcome in Chemistry.

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