



THE MEDIATING EFFECT OF TEACHERS' INNOVATIVE WORK BEHAVIOR ON THE RELATIONSHIP BETWEEN TEACHER ENGAGEMENT AND STUDENTS' LEARNING OUTCOMES IN MATHEMATICS

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ABSTRACT

The study was conducted to determine whether teachers' innovative work behavior is mediating the relationship between teacher engagement and students' learning outcomes in mathematics. The study utilized a quantitative, non-experimental design using the correlational research method. The respondents were 288 grade ten students in four different schools in the division of Tagum City. A simple random sampling was used to identify the respondents. Two sets of research instruments were used in this study, and the Statistics tools applied were mean Pearson r and regression analysis. Findings showed that teacher engagement was highly extensive while the level of students' learning outcomes was very satisfactory.

Moreover, the level of teachers' innovative work behavior was high. Results also revealed no significant relationship between teacher engagement and students' learning outcomes. There was no significant relationship between the teacher's innovative work behavior and students' learning outcomes. However, there was a significant relationship between teacher engagement and innovative work behavior. Lastly, there is no significant mediation takes place in the model. It does not claim further that teachers' innovative work behavior influence students' learning outcome in mathematics. It is recommended that further researchers exploring the mediating effect of teachers' innovative work behavior on the relationship between teacher engagement, and students' learning outcomes be conducted to substantiate the findings.

KEYWORD: Education, Teachers' Innovative Work Behavior, Teacher Engagement, Students' Learning Outcomes in Mathematics, Teachers, Students, Mediation Analysis, Sobel's z-test, Davao del Norte.

INTRODUCTION

Teachers sow the seeds of understanding in their students about the world and its norms; they equip them with knowledge and the ability to acquire and synthesize it. Innovation is becoming a vital driving factor for sustainability and success in today's fast-paced and continually changing society. This aspect is even more important in schools because it plays an important role in the information economy, as several governments have stated (Thurlings, 2014). The teacher must always seek new ways to transmit useful information to students and make attempts to keep their curiosity and interests alive. Another reason to emphasize the importance of innovative conduct in education is that our knowledge-intensive culture places increasing demands on both students and teachers. (Brandsford et al., 2005).

Filipino students struggle to acquire knowledge and perform poorly in sessions that require higher-order thinking skills, resulting in poor learning results. These are visible in student performance in national and



international mathematical competency surveys. Separate investigations on the mathematics performance of preservice teachers and mathematics instructors on the 1993 and 1994 Professional Board Examination for Teachers (Ibe, 2014) demonstrate that individuals who have taught at the elementary and secondary levels had low performance in mathematical competencies (Ganal & Guiab, 2014).

Locally, One school in Tagum City Division is always concerned with the students' performance in mathematics in the classroom and has observed significant issues in students' learning outcomes. In School Year 2018-2019, particularly in the second quarter, the proficiency of the Grade 10 level of the school was about 55.92%. This showed a depressing reality that the subjects need special attention and concern. The aforementioned rating was one of the reasons that the researcher conducted this study. This would help to determine the mediating effect of teachers' innovative work behavior on the relationship between teacher engagement and students' learning outcomes.

Knowing these problems, the researcher believed that the urgency of conducting this study and the mediating effect of teachers' innovative work behavior on the relationship between teacher engagement and students' learning outcomes would somehow alleviate students' performance in mathematics. Innovative work behavior in teachers can thus provide several useful insights regarding the factors that drive school change. Innovative work behavior of teachers can engage in schools, which leads to optimal students learning outcomes. Most importantly, it can contribute to society by enhancing how children accumulate and assimilate knowledge from teacher engagement. Thus, this study served as the basis for intervention programs in mathematics.

METHODOLOGY

Research Design

This study utilized a quantitative non-experimental design employing mediation analysis which relies on the interpretation, observation, or interactions to conclude. It is quantitative since the study examined independent and dependent variables, the teachers' engagement, and students learning outcomes with innovative work behavior as its mediating variable in Mathematics 10 of Tagum City, Davao del Norte. In addition, the study was conducted in the four schools of the Tagum City division. Participants were 321 grade 10 students enrolled in S.Y 2019 – 2020. Each set of samples was identified using simple random sampling and determining the number of participants in each cluster. Systematic sampling was then employed to identify the participants.

Research Instrument

This study made use of researcher-made questionnaires. There are two sets that suit evaluating the extent of teacher engagement and teachers' innovative work behavior with the following indicators that correspond to the three significant variables. The teacher engagement variable uses absorption, vigor, and dedication as the indicators. Each indicator contains seven (7) questions which make the tool for teacher engagement a total of twenty-one (21) questions. For the students' learning outcomes in mathematics. The researcher used the grade in the third quarter of the grade ten students. The teachers' innovative work behavior includes idea generation, idea promotion, and idea realization as indicators. There were seven (7) questions for each indicator, making the tool a total of twenty-one (21) questions.

To ensure the study's validity, the questionnaire was checked first by the researchers' adviser and validated by the panel of experts. Then, the researcher sought approval from the panel through validation of the questionnaires before the distribution. To ensure reliability, the questionnaire was tested through Cronbach alpha to analyze the consistency of the items in the test. The researcher sought permission from the Schools Division Superintendent (SDS), school principals, participants, and parents. Formulation of the research instruments was done and submitted to the pool of experts and administered pilot testing for validity and reliability. Afterward, the research instruments were administered and retrieved for data analysis. In the statistical treatment of data, this study used to mean, Pearson r, and regression analysis. Lastly, this study adhered to the Belmont Report, which made up the core principles: respect for person, beneficence, and justice.

RESULTS AND DISCUSSIONS

Table 1 presents the summary of the extent of teacher engagement. Among the three indicators, vigor got the lowest mean of 4.34. Followed by absorption with a mean of 4.34. And dedication got the highest mean of 4.50. All indicators have a descriptive equivalent of highly extensive respectively.

Madrid, (2014) stated that teacher interaction with learners in class has been identified as a major component influencing the achievement of inclusive educational results and offering supports in the general classroom.



Table 1
Summary on the Extent of Teacher Engagement

INDICATORS	MEAN	DESCRIPTIVE EQUIVALENT
Absorption	4.34	Highly Extensive
Vigor	4.34	Highly Extensive
Dedication	4.50	Very Highly Extensive
Overall	4.39	Highly Extensive

Table 2 presents the Level of Students' Learning Outcomes. The grades in Mathematics got a mean of 86.16 with a descriptive equivalent of very satisfactory. This means that students' learning outcomes in mathematics are high. Implies that result from students learning outcomes of grade 10 from four different schools of Tagum City division is very satisfactory.

According to Peterson et.al (2014) In classroom activities, it was noticed that children had achieved a high level of achievement in mathematics. Students constantly showed a high interest in mathematics, and competitive mathematics activities were used.

Table 2
Level of Students' Learning Outcomes in Mathematics

VARIABLE	MEAN	DESCRIPTIVE EQUIVALENT
Grade	86.160	Very Satisfactory

Table 3 presents the summary on the level of teachers' innovative work behavior. Among the three indicators, idea promotion got the lowest mean of 4.06, followed by idea generation, which got 4.15. and the idea realization got the highest mean of 4.17. All the indicators have a descriptive equivalent of high.

The overall mean of 4.12 is high and indicates that innovative work behavior is observed most of the time. This result further implies that teachers' innovative work behavior of grade 10 from Tagum City division is high on this indicator.

Mingjun et. al (2017) that learners benefit from innovative work behavior in the teaching profession. Teachers' innovative work behavior influences students' proactive personalities.

Table 3
Summary on the Level of Teachers' Innovative Work Behavior

INDICATORS	MEAN	DESCRIPTION
Idea Generation	4.15	High
Idea Promotion	4.06	High
Idea Realization	4.17	High
Overall	4.12	High

Table 4 presents the significance of the relationship between teacher engagement and students' learning outcomes in Mathematics. The r-value of 0.087 between the teacher engagement and students' learning outcomes connotes that there is a very low correlation, almost negligible relationship.

The coefficient of determination (r^2) for both teacher engagement and students' learning outcomes which is 0.007, means that 0.7% of the variation in teacher engagement could be attributed to the students' learning outcomes.

Since the p-value of 0.103 is greater than the 0.05 level of significance, the null hypothesis is not rejected. This means that there is no significant relationship between teacher engagement and students' learning outcomes in Mathematics. The result suggests that the data are insufficient to claim a significant relationship between the two variables.



Table 4
Significance of the Relationship Between the Teacher Engagement and Students' Learning Outcomes in Mathematics

Variables	Mean	SD	r-value	r ²	p-value	Decision@ α = 0.05
Teacher Engagement	4.39	0.29	0.087	0.007	0.103	Not Rejected
Students' Learning Outcomes	86.16	5.72				

Table 5 presents the significance of the relationship between the teachers' innovative work behavior and students' learning outcomes in Mathematics.

The r-value of 0.092 between the teachers' innovative work behavior and students' learning outcomes connotes the degree of a linear relationship and has a very low correlation, almost negligible relationship.

The coefficient of determination (r²) which is 0.009 for teacher innovative work behavior and students' learning outcomes in Mathematics means that 0.9% of the variation in teacher innovative work behavior could be attributed to students' learning outcomes. The rest of 99.01% is chance variation.

Since the p-value of 0.084 is greater than the significance level of 0.05 the null hypothesis is failed to reject. Thus, there is no significant relationship between the teacher's innovative work behavior and students' learning outcomes.

The findings revealed substantial links between innovative work behavior and learning outcomes. Students who displayed the learning habit type had significantly higher test scores. The findings suggest that innovation can improve learning effectiveness and outcomes (Goda, 2014).

Table 5
Significance of the Relationship Between the Teachers' Innovative Work Behavior and Students' Learning Outcomes in Mathematics

Variables	Mean	SD	r-value	r ²	p-value	Decision@ α = 0.05
Teacher Innovative Work Behavior	4.12	0.50	0.092	0.009	0.084	Not Rejected
Students' Learning Outcomes	86.16	5.72				

Table 6 presents a significant relationship between teacher engagement and innovative work behavior. The r-value 0.294 for teacher engagement and teachers' innovative work behavior connotes the linear relationship between these variables and has a slight correlation, definite but small relationship.

The coefficient of determination (r²) of 0.087 for teacher engagement and innovative work behavior, means that 8.7% of the variation that Teacher Engagement could be attributed to innovative work behavior.

Since the p-value of 0.000 is less than the margin of error of 0.05. then it follows that the null hypothesis is rejected. There is a significant relationship between teacher engagement and innovative work behavior.

Employee autonomy and organizational support have a direct and beneficial impact on employee work behavior and their innovative work behavior, according to innovative work behavior and work engagement. Furthermore, there are indirect correlations between these work environment characteristics and innovative work behavior (Siddiqi, 2017).



Table 6
Significant Relationship Between the Teacher Engagement and Teachers' Innovative Work Behavior

Variables	Mean	SD	r-value	r ²	p-value	Decision@ $\alpha = 0.05$
Teacher Engagement	4.39	0.29	0.294	0.087	0.000	Ho is Rejected
Teacher Innovative Work Behavior	4.12	0.50				

CONCLUSION

Based on the findings of this study, the researcher concludes that the level of students' mathematical fluency is low. Moreover, the extent of students' heuristics is moderately extensive, and students' non-routine problem-solving skills is low. The R-value of 0.087 between the teacher engagement and students' learning outcomes indicates a very low correlation, almost negligible relationship. Since the p-value of 0.103 is greater than the margin of error of 0.05, the null hypothesis is not rejected. The R-value of 0.294 between the teacher innovative work behavior and students' learning outcomes connotes the degree of a linear relationship and has a very low correlation, almost negligible relationship. Since the p-value of 0.000 is greater than the margin of error of 0.05, the null hypothesis is not rejected. The R-value 0.092 for teacher engagement and innovative work behavior connotes the linear relationship between these variables and has a slight correlation, definite but small relationship. Since the p-value of 0.084 is less than the margin of error of 0.05, then it follows that the null hypothesis is rejected. The p-value of 0.201 is greater than the level of significance 0.05 ($z = -1.280, p > 0.05$). Thus, there is no significant mediation takes place in the model.

RECOMMENDATION

This research helped the students to associate things they learned to create their new ideas in solving difficult mathematical problems and consult the teacher for every new strategy being discovered by exposing them to peer mentoring in mathematics club. This study helped the teachers to solicit information and new ideas, allowing them to generate their solutions to the problem and integrate things in mathematical class through lesson integration and proving class hour as an intervention. This study helped the Principal/School head and academic coordinators in assuring that teachers well deliver competencies. Giving importance to teachers as organizational members enthusiastic for innovative ideas by giving more related seminars and training on mathematics teachers. This study helped the Department of Education to have the particular intervention of mathematical innovations, and give avenue on teachers innovating teaching strategy. Through this study, the department promoted the welfare of the teachers by supporting and continuing on their post-education.

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