Correlation Between the Teaching Performance of DORSU-MST-Math Graduates and Their Students’ Performance in Mathematics

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ABSTRACT

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| **Aims:** To examine the relationship between the teaching performance of secondary Mathematics teachers who graduated from the Davao Oriental State University Master of Science Teaching Mathematics (DORSU-MST-Math) program and the academic performance of their students.  **Study design:** Descriptive-correlational quantitative research design.  **Place and Duration of Study:** DepEd Schools Division of Davao Oriental and DepEd Schools Division of Davao Oriental, between March and April 2025.  **Methodology:** Twenty-five DORSU-MST-Math graduate teachers in the DepEd Divisions of Davao Oriental and Mati City (Philippines) participated. For each teacher, 25 students were randomly selected (total N = 625), representing half of the smallest class size among participating teachers. Data were collected via two questionnaires: one in which students rated their teachers’ performance on four indicators (commitment, subject matter knowledge, teaching for independent learning, and management of learning), and another comprising standardized mathematics items from the TIMSS 2019 assessment.  **Results:** The results revealed that the teachers’ performance ratings were generally in the “Outstanding” range, and the students’ average TIMSS score (86.24) was classified as “Very Good.” Pearson correlation analysis yielded a weak positive association (r = 0.08) between teachers’ overall performance and students’ performance, which was not statistically significant (p = 0.085). This indicates that no significant relationship was found between teacher performance and student achievement in mathematics. Therefore, caution is warranted in interpreting these findings, and no causal or substantive association should be inferred from the data.  **Conclusion:** This underscores the importance of exploring additional factors that may contribute to student learning outcomes. A more holistic approach to understanding student achievement is recommended, including further investigation into other potential determinants of mathematics performance. |

*Keywords: Teaching Performance,* *Mathematics, Students’ Performance, independent learning*

1. INTRODUCTION

Mathematical literacy is essential for daily life and the workforce, enabling individuals to adapt to a changing society by understanding mathematical concepts embedded in everyday information (Ojose, 2023). This skill fosters critical thinking and problem-solving abilities, which are key to personal development and societal progress (Agbata et al., 2024). Despite the recognized importance of mathematics, many students worldwide exhibit low achievement and lack interest in the subject (Muhammad, 2024). Mathematics is often considered one of the most challenging school subjects (Ali and Jameel, 2016).

Education systems must address these challenges to equip future citizens with the skills and dispositions needed to respond to such issues (Ventista, 2023) and in relation to this issue, teachers play a crucial role in this process, serving as the primary facilitators of student learning (Ghunio, Niamatullah, & Shaikh, 2023). Teacher quality is widely recognized as a key factor influencing student performance (Guo et al., 2023) however, it remains unclear which specific teacher characteristics are most impactful for student achievement (Call, 2018).

In response, many schools emphasize continuous professional development (CPD) for teachers as a strategy to improve student outcomes (Sarah & Musa, 2024). Effective CPD enhances teachers’ knowledge, skills, and competencies, empowering them to deliver high-quality instruction. In mathematics education, teachers need deep content knowledge, pedagogical expertise, enthusiasm for teaching, and strong subject knowledge, in particular, enables clear explanations and varied strategies, thereby supporting higher student engagement and thinking (Burrill, 2017). Qualifications such as advanced degrees, content expertise, and teaching experience are associated with better student outcomes. (Smith, 2019).

For example, continuing education programs often improve teachers’ competencies and align their practices with professional standards (Mohamed et al., 2024). Teacher qualifications such as level of education, math content expertise, teaching experience, and certification play an important role in student outcomes (Podolsky et al., 2019). Qualifications such as advanced degrees, content expertise, and teaching experience are associated with better student outcomes (Chachar, 2023).

Continuous professional growth is essential, as it equips educators with innovative strategies that promote optimal learning outcomes (Nasution et al., 2024). However, research has produced mixed results on whether teachers’ qualifications (such as holding an advanced degree) directly correlate with student achievement (Chang et al., 2020).

With that, this study examines the relationship between teaching performance measured by specific indicators and students’ mathematics performance, in order to clarify how teacher quality may influence learning outcomes.

The study on the teacher performance and students' performance in mathematics has several limitations that should be acknowledged:

The study focuses on mathematics teachers who graduated from the DORSU-MST-Math program and are currently teaching in public secondary schools within the Division of Davao Oriental and Mati City, along with their respective students. The evaluation of teaching performance is confined to four indicators namely: commitment, knowledge of subject matter, teaching for independent learning, and management of learning. Meanwhile, the assessment of students' performance is solely based on Trends in International Mathematics and Science Study (TIMSS) 2011 math assessment. The data collection focuses on a specific school year which are S.Y. 2024-2025 to ensure consistency and relevance of the findings. Specifically, this research aims to correlate the teaching performance of Master of Science Teaching (MST) Mathematics graduates of Davao Oriental State and their students’ performance in Mathematics.

Of the total 65 graduates, only 25 were deemed valid participants for this study. The exclusion of the remaining 40 individuals was due to several factors: some were employed as non-teaching personnel, others did not specialize in mathematics instruction, and a portion were no longer residing in the country at the time of data collection. The researcher randomly selected 25 students from each participating teacher’s class. This approach ensured equal representation of students across all teacher groups. The sample size of 25 students per class was determined based on the class with the smallest enrollment, allowing for consistent sampling across all participating teachers. In total, the study included 625 student participants

**1.1 Objectives**

This paper investigates the contribution of the Master of Science in Teaching (MST) major in Mathematics program at Davao Oriental State University (DOrSU) to the professional performance of its graduates currently teaching Mathematics in secondary public schools. Specifically, it examines aspects of teacher performance such as commitment, knowledge of the subject matter, teaching for independent learning, and management of learning. In this regard, the study aims to address the following objective:

1. To determine whether there is a significant relationship between teaching performance and students' performance in Mathematics.
   1. **Conceptual Framework**

The conceptual framework of this study, illustrated in Fig. 1, demonstrates the relationships among the key variables: teaching performance (independent variable), students’ performance (dependent variable) which was further broken down into four sub-indicators: relevance to commitment, knowledge of subject matter, teaching for independent learning, and management of learning.

Teaching Performance

Students’ Performance

* Trends in International Science and Mathematics Study (TIMSS)
* Relevance to Commitment
* Knowledge of Subject Matter
* Teaching for Independent Learning
* Management of Learning

**Fig. 1: The schematic diagram showing the relationship between the independent and dependent variables of the study**

2. material and methods

2.1 Research Design

A descriptive correlational design was employed to determine whether a relationship exists between teachers’ performance and their students’ performance. Such an approach is appropriate for addressing “what” and “how related” questions in educational research (Deckert and Wilson, 2023). In this study, teachers’ performance indicators (commitment, content knowledge, teaching for independent learning, and management of learning) were treated as the independent variable, and students’ mathematics scores were the dependent variable. By analyzing correlations, the study explored how teaching performance might be associated with students’ performance.

2.2 Research Instrument

There were two sets of questionnaires to be used in this study. These questionnaires and were adapted in this study. The questionnaire for independent variable which is teaching performance is patterned under four indicators which are relevance to commitment, knowledge of subject matter, teaching for independent learning, and management of learning. On the other hand, the questionnaire for dependent variable which is student performance was measured using the Mathematics Questionnaire from Trends in International Mathematics and Science Study (TIMSS) 2019. The Trends in International Mathematics and Science Study (TIMSS) assesses the knowledge and skills of approximately 250,000 students globally, facilitating international and national comparisons of educational curricula (Demir and Gelbal, 2023).

In the first questionnaires, the student respondents are asked to evaluate their teacher’s performance by putting a check mark in the box that correspond to the following anchors: five (5) Outstanding, four (4) Very Satisfactory, three (3) Satisfactory, two (2) Unsatisfactory, and one (1) Poor. In another questionnaire, they were given a multiple choice mathematical problems and is asked to choose the letter of the correct answer. The researchers modified the questionnaire to suit the study and was submitted to the panel of experts for validation.

2.2 Respondents of the Study

The participants were 25 secondary mathematics teachers who graduated from the DORSU-MST-Math program and were currently teaching in public schools within the DepEd Divisions of Davao Oriental and Mati City (March–April 2025). For each teacher, 25 students were randomly selected from their mathematics classes, resulting in a total of 625 student participants. The sample size was determined by taking half of the number of students in the smallest class among the participating teachers, ensuring an equal number of student respondents per teacher. All participants (teachers and students) participated voluntarily after giving informed consent.

Table 1. The distribution of respondents.

|  |  |  |  |
| --- | --- | --- | --- |
| Year Graduated | Number of Graduates (N) | Number of Valid Participants | Number of Randomly Selected Students |
| 2003 - 2004 | 4 | 0 | 0 |
| 2005 - 2006 | 7 | 1 | 25 |
| 2007 - 2008 | 7 | 1 | 25 |
| 2009 – 2010 | 6 | 2 | 50 |
| 2011 – 2012 | 4 | 1 | 25 |
| 2013 - 2014 | 3 | 1 | 25 |
| 2015 - 2016 | 4 | 2 | 50 |
| 2017 – 2018 | 2 | 1 | 25 |
| 2019 - 2020 | 15 | 9 | 225 |
| 2021 – 2022 | 9 | 4 | 100 |
| 2023 - 2024 | 4 | 3 | 75 |
| Total | 65 | 25 | 625 |

**2.3 Data Gathering**

Data were collected in March–April 2025. A list of DORSU-MST-Math graduates was obtained from the university registrar to identify eligible teacher participants. Permission to conduct the study was secured from the DORSU Graduate School and the University Research Ethics Board. Letters requesting approval were sent to the Division Superintendents of Davao Oriental and Mati City and to the principals of the schools where the teachers taught. Parental consent was obtained for student respondents, as many were minors.

Questionnaires were administered online via Google Forms during school hours. Each selected student received the questionnaire links in the presence of a teacher. Teachers were not present when students completed their questionnaires to ensure independent responses. After data collection, responses were checked for completeness. Any missing or inconsistent data were addressed (through follow-up with respondents or by listwise deletion) before analysis.

**2.4 Statistical Analysis**

Data were exported to statistical software for analysis. Descriptive statistics (means and standard deviations) were calculated for each teaching performance indicator and for the students’ TIMSS scores. Pearson’s correlation coefficient (r) was used to examine the relationship between the teachers’ overall performance mean and their students’ performance mean. The significance level was set at α = 0.05. A correlation table was prepared showing the r-value, p-value, and interpretation of significance.

**2.4.1 Mean.**In statistics for research, the mean is a fundamental measure of central tendency that summarizes the overall trend of a dataset. It is calculated by dividing the sum of all data points by the total number of observations (Smith, 2020). This tool was used to answer the main purpose of the study, statement of the problem 1, statement of the problem 2.

**2.4.1 Pearson *r***

It is the linear correlation between two variables. This statistical tool was used to determine if there is a significant relationship between professional development and teaching efficacy. In this study, this tool was used to measure the significant relationship between the level of teaching performance of DOrSU-MST-Math Gradutaes and the level of students’ performance.

Table 2: Descriptive Interpretation of Computed r

**Computed r Descriptive Interpretation**

+/- 1.00 Perfect Correlation

Between +/- 0.75-+/-0.99 High Correlation

Between +/- 0.51-+/-0.74 Moderately High Correlation

Between +/- 0.31-+/-0.50 Moderately Low Correlation

Between +/- 0.01-+/-0.30 Low Correlation

0 No Correlation

3. results and discussion

3.1 Descriptive Statistics

The level of teaching performance is presented in Table 3. Teaching performance was summarized by the four indicators (commitment, subject knowledge, independent learning, management) and the overall mean for each teacher. Students’ performance is given as the mean TIMSS score per teacher’s class. The descriptive data show that all four teaching performance indicators had high average ratings (between 4.31 and 4.37). Among the indicators, Teaching for Independent Learning had the highest mean (4.37), indicating that this was the strongest area of performance among the teachers. Overall, the teachers’ performance variables were rated from Very Satisfactory to Outstanding, with none in the lower categories. This underscores that these MST graduates consistently perform at a high level across multiple dimensions of teaching quality. The descriptive statistics for student performance (mean score = 86.24) likewise show that students are performing at a high level in mathematics.

3.2 The Relationship between Teaching Performance and Students' Performance

Table 4 shows the Pearson correlation results between teachers’ performance and students’ performance. The overall mean teaching performance (across all indicators) was 4.32 (“Very Satisfactory”), and the students’ mean TIMSS score was 86.24 (“Very Good”). The calculated Pearson correlation coefficient was r = 0.07, with p = 0.085. Since p > 0.05, the correlation is not statistically significant, indicating a negligible effect size. Therefore, the null hypothesis which is, “there is no relationship between teacher performance and student achievement” was not rejected. In practical terms, this means that no significant linear association was found between teachers’ overall performance and their students’ mathematics scores in this sample.

Although both sets of means are relatively high, the very low and non-significant correlation suggests that higher teacher performance ratings did not reliably correspond to higher student performance. In other words, teachers rated as “Outstanding” did not necessarily have students who scored higher on the TIMSS assessment than those rated “Very Satisfactory.” No meaningful conclusions about a relationship between teacher performance and student achievement can be drawn from this result. This finding highlights the need for caution in interpreting high mean scores as indicative of a causal or influential relationship.

This study aligns with previous research noting the multifaceted nature of factors affecting student achievement. For example, Inot et al. (2024) found that teacher learning management strategies did not definitively predict Grade 8 students’ mathematics performance in a post-pandemic context. Other studies have suggested that factors such as the teacher-student relationship or student self-efficacy may have a more substantial influence than teacher qualifications or classroom management style (Appiah et al., 2022).

These findings reveal that no significant relationship was found between teacher performance and student achievement in mathematics. Therefore, caution is warranted in interpreting these results, and no causal or substantive association should be inferred from the data. This highlights the importance of exploring additional factors that may contribute to student learning outcomes. A more holistic approach to understanding student achievement is recommended, including further investigation into other potential determinants of mathematics performance.

**Table 3. Descriptive Table**

|  |  |  |  |
| --- | --- | --- | --- |
| **Variables** | **N** | **Mean** | **Descriptive Level** |
| * 1. **Teaching Performance**   2. Commitment   3. Knowledge of Subject Matter   4. Teaching for Independent Learning   5. Management of Learning   *Overall*   1. **Students’ Performance**    1. TIMSS | 625  625 | 4.33  4.31  4.37  4.27  4.32  86.24 | Outstanding  Outstanding  Outstanding  Outstanding  Outstanding  Very Good |

Table 4. The Relationship between Teaching Performance and Students' Performance

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variables** | **Mean** | **n** | **r-value** | **p-value** |
| Teaching Performance | 4.32 | 625 | .07 | .09 |
| Students' Performance | 86.24 |

4. Conclusion and recommendation

4.1 Conclusion

In conclusion, while the study affirms the presence of high teaching performance among DOrSU-MST Mathematics graduates, the lack of a significant correlation with student achievement highlights the complexity of educational outcomes, emphasizing the necessity for more holistic approach to understanding students’ performance, including further investigation into other potential determinants of mathematics performance.. These may include learner motivation, socio-economic status, home support, and access to educational resources. As recent studies emphasize, student achievement is a multifaceted outcome shaped by both classroom and non-classroom variables (García-Cabot et al., 2020). Therefore, improving student outcomes requires a comprehensive strategy that includes teacher development, curriculum support, and broader contextual considerations (Kraft & Hill, 2021).

4.2 Recommendation

Based on these findings, we recommend the following actions:

Given that student achievement is influenced by various factors beyond teaching performance of DOrSU-MST-Math graduates to have a significant impact to their students’ performance, the Department of Education may expand differentiated professional development for teachers. This includes regular workshops and training in instructional strategies that address diverse learners’ needs and foster independent learning. For example, training on data- driven instruction, formative assessment, and integrating technology could help teachers better support all students. DepEd may also establish monitoring and feedback systems (e.g., classroom observations, student surveys) to assess the effectiveness of these programs and guide continuous improvement.

To ensure the continued quality and relevance of the MST-Math program, DORSU (MST-Math program coordinators) may conduct periodic curriculum reviews (e.g., every 2–3 years) that involve faculty, industry experts, and alumni. The MST-Math curriculum may be updated to incorporate current best practices in mathematics education, emerging content knowledge, and modern teaching methodologies. Encouraging MST students and alumni to engage in research projects on teaching innovation could also help the program stay responsive to classroom needs.

Teachers may engage in ongoing professional learning focused on student-centered and differentiated instruction. They can adopt reflective practices (such as analyzing student assessment data and peer observations) to continuously refine their teaching. Collaborating in professional learning communities can help teachers share strategies for supporting struggling students and enriching advanced learners.

Students may be guided to take responsibility for their learning. They can be encouraged to develop effective study habits, time management, and self-assessment skills. Providing students with additional resources (online practice tools, supplementary modules, tutoring) can help them master mathematical concepts. Cultivating a growth mindset in students may also enhance their engagement and resilience in learning mathematics.

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**CONSENT**

Parental consent forms were secured since the respondents were minors, and informed consent forms were obtained to ensure respondents’ understanding and voluntary participation.

**ETHICAL APPROVAL**

An endorsement letter from the Graduate School Dean and ethical clearance from the University Research Ethics Board were secured, followed by a request for approval from the two Schools Division Superintendents to conduct the study in the research locale.

**AUTHOR DECLARATION OF AI USAGE**

The authors hereby declare that generative AI technologies, such as ChatGPT, were used during the writing and/or editing of this manuscript. The following details include the name, version, model, and source of the generative AI technology, as well as the input prompts provided.

Name and Source of AI Technology: ChatGPT by OpenAI

Model: GPT-4-turbo

Version/Access Date: Accessed via ChatGPT platform on April to May 2025.

Purpose of Use:

Language editing and grammar proofreading

Academic tone and clarity improvement

Assistance in rephrasing paragraphs

Examples of Input Prompts Provided:

“Apply this suggestion to the paragraph”

“Proofread the grammar rules in this section”

“Check grammar and coherence of the following text”

The authors affirm that all AI-assisted content was reviewed and validated by the authors to ensure accuracy and appropriateness for scholarly publication.

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