



The Mathematics Teaching Performance of Scholar Education Graduates in Selected Public Schools in the Philippines: An Explanatory Sequential Mixed Method Study

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Abstract

This explanatory sequential mixed method study aimed to determine the mathematics teaching performance of Bachelor of Secondary Education (BSEd) major in Mathematics scholar education graduates for the period 2010-2015 of a certain state university in Western Visayas region in the Philippines. Eight BSEd major in Mathematics scholar education graduates and their eight department heads were included in the study purposively. The researcher adopted the Results-Based Performance Management System (RPMS) tool of the Department of Education (DepEd) and utilized interview guide and observation guide as data gathering instruments. Moreover, the statistical tools used were mean and standard deviation to analyze and interpret quantitative data. On the other hand, thematic analysis was used to analyze qualitative data. The study revealed that the overall performance of the scholar education graduates was very satisfactory. Moreover, the scholar graduates manifested the following in their teaching performance: a) content knowledge and relevance through mastery of the content; b) instructional strategies by using game-based strategy; c) learning activities and instructional materials by using ICT-based instructional materials; d) lesson organization and presentation by using 4A's Model and DepEd's format in lesson planning; e) classroom management by imposing rules and practicing routines; and f) evaluation by using authentic assessment. This shows that the scholar graduates have discovered new teaching strategies, different ways of teaching mathematics, used innovative materials and assessed students in various means not just to make themselves productive and excellent in mathematics education but to achieve quality learning for the students. It's only then that teaching becomes rewarding.

Keywords: Teaching Performance, Teachers' Experiences, Scholars' Performance, Public School Teachers, Mathematics Teachers, Education Graduates

Introduction

The importance of education in national development can never be underestimated.

Education is a key investment that can break the Filipinos' seemingly endless cycle of poverty, and provides the people, particularly the youth, with more opportunities. No country in the world can harness the full potential of its people without committing them to standard education. This makes education the most potent vehicle for the development and empowerment of an individual; economic, political, and social development; national growth; and enthronement of peace (Exam Ethics Project, 2005). The effectiveness of an educational institution is the extent to which the set goals and objectives of a school are attained in relation to quality, quantity, equality, and quality of education (Yusuf & Alabi, 2013). For quality education to be maximized, the two of the most important factors to be considered are the teachers and the performance of graduates (Nabayra et al., 2021). They are the frontliners of any education system in achieving its goals and educational objectives. Hence, the performance of teachers is widely recognized as a significant factor influencing education quality (Nabayra & Nabayra, 2021).

Furthermore, Ozgenel and Ozgan (2019) found out that teachers' performances positively affect the effectiveness of school. They concluded that teachers' performance predicted school effectiveness and positively influenced. When it is recognized that building effective schools is a difficult process, teachers are expected to be involving and perform at a high level to overcome these challenges and achieve the school's basic objectives at the desired level. Robinson (n.d.) also advanced that teacher evaluation is necessary since teacher quality is positively associated to student learning and for accountability reasons. Abdullah and Das (2019) also concurred this because for them, evaluation of teaching performances is a large factor regarding learning outcome, student retention, faculty retention, time, classroom environment and salary in developing country like the Philippines. Hence, policy makers and school leaders must allow an evaluation where teachers determine their performance, receive feedback, and establish a performance evaluation system with improvements because of the performance evaluation process (Ozgenel & Ozgan, 2019).

In addition, with education as one of the priority investments of the state for a sustained and developed country, thousands of high school and college students from all over the Philippines receive undergraduate scholarships courtesy of the Department of Science and Technology – Science Education Institute (DOST-SEI) every year. Through these scholarship programs, the DOST-SEI envisions to have developed the Philippines' human resource capacity in science and technology as required to produce demand-driven outputs that meet global standards (DOST-SEI, 2015).

In return, DOST-SEI scholars are required to render service in the country, preferably in their fields of specialization, after graduation for a period equivalent to the number of years they enjoyed the scholarship. The success of these programs offered by the DOST-SEI could only be measured through its graduates' achievements and contributions to the country.

Moreover, in terms of mathematics education, according to Prokop et al. (2015), some research studies indicate that the quality of education depends on the teachers' provision to students based on what they do in the classroom. They concluded that, in preparing the students of today to become successful individuals of tomorrow, science and mathematics teachers need to ensure that their teaching is effective. According to Abdullah & Das (2019), among the excellent performing teachers are the teachers with science background while most of the poor performing teachers with social science background. This only implies that teachers hold an important role in effectively pursuing the teaching-learning process.

Hence, this study sought to determine the teaching performance of DOST undergraduate grantees termed as scholar education graduates in this study, specifically the graduates of Bachelor of Secondary Education (BSEd) major in Mathematics. This could show how DOST-SEI scholar education graduates exhibit excellence in their teaching performance which may inspire and motivate other teachers to embody the culture of excellence in their profession.

Methodology

This study employed the mixed method research design. This type of research design used both quantitative and qualitative methods in a single study to provide a more comprehensive understanding of the research problem. Specifically, the researcher utilized the explanatory sequential mixed method which involved the collection of quantitative data, followed by using qualitative method, to refine the findings. The two types of data were analysed separately, with the results of the qualitative analysis used by the researcher to expand upon the results of the quantitative study (Fraenkel, Wallen, & Hyun, 2012).



Figure 1: Explanatory sequential mixed method design

Using this design, the researcher aimed to determine the mathematics teaching performance of Bachelor of Secondary Education (BSEd) major in Mathematics DOST-SEI scholar education graduates of a certain state university in the Western Visayas region in the Philippines. Specifically, it sought answers to the following questions: a) What is the mathematics teaching performance of scholar education graduates in terms of their Individual Performance Commitment and Review Form (IPCRF) results?; and b) How do

scholar education graduates manifest their performance in terms of: (a) Content Knowledge and Relevance, (b) Instructional Strategies, (c) Learning Activities and Instructional Materials, (d) Lesson Organization and Presentation, (e) Classroom Management, and (f) Evaluation?

The mathematics teaching performance in this study was gathered from eight BSEd major in Mathematics DOST-SEI scholar education graduates of a certain State University in Western Visayas region for the period 2010-2015 and their eight department heads. This study included all the scholar graduates under DOST-SEI scholarships who graduated from the period 2010-2015 and took BSEd major in Mathematics in the included university, as reflected on the list provided by the DOST-SEI Region VI. Furthermore, these scholar education graduates were at least four years in service after graduation. All of them were currently employed in the Department of Education (DepEd) in the Philippines. On the other hand, the eight department heads included master teachers, head teachers or principals of the graduate scholars. These department heads observed the graduate scholars during their classroom observation for their RPMS portfolio of the previous year.

For this study, the researcher adopted the Results-Based Performance Management System (RPMS) tool of the Department of Education (2018) and utilized interview guide and observation guide as data gathering instruments. These research instruments were subjected to content validation by different experts depending on the nature of each instrument. Moreover, the statistical tools used were mean and standard deviation to analyse and interpret quantitative data. On the other hand, thematic analysis was used to analyze qualitative data.

Results

Table 1: Performance of scholar education graduates as reflected in their IPCRF
(individual performance commitment and review forms)

Key Result Areas (KRA's)												
Scholar	Content Knowledge and Pedagogy	Wt 22.5%	Learning Environment and Diversity of Learners	Wt 22.5%	Curriculum and Planning	Wt 22.5%	Assessment and Reporting	Wt 22.5%	Plus Factor	Wt 10%	Overall Rating	Adjectival Rating
	4.83	1.09	4.67	1.05	5.00	1.13	4.17	0.94	5.00	0.50	4.70	O
1	4.67	1.05	4.33	0.97	4.50	1.01	4.17	0.94	3.50	0.35	4.33	VS
2	4.67	1.05	4.50	1.01	5.00	1.13	4.33	0.97	5.00	0.50	4.66	O
3	4.00	0.90	4.00	0.90	4.00	0.90	4.00	0.90	4.00	0.40	4.00	VS
4	4.33	0.97	4.33	0.97	4.50	1.01	4.44	1.00	5.00	0.50	4.46	VS
5	4.33	0.97	4.00	0.90	4.67	1.05	4.33	0.97	5.00	0.50	4.40	VS
6	5.00	1.13	5.00	1.13	4.67	1.05	4.33	0.97	5.00	0.50	4.78	O
7	5.00	1.13	5.00	1.13	4.67	1.05	4.00	0.90	4.00	0.40	4.60	O
8	4.60	1.04	4.48	1.01	4.63	1.04	4.22	0.95	4.56	0.46	4.49	VS
	0.33	0.07	0.37	0.08	0.30	0.07	0.15	0.03	0.58	0.06	0.24	

Note: Description is based on the following scale. 4.500-5.000 (Outstanding), 3.500-4.499 (Very Satisfactory), 2.500-3.499 (Satisfactory), 1.500-2.499 (Unsatisfactory), below 1.500 (Poor)

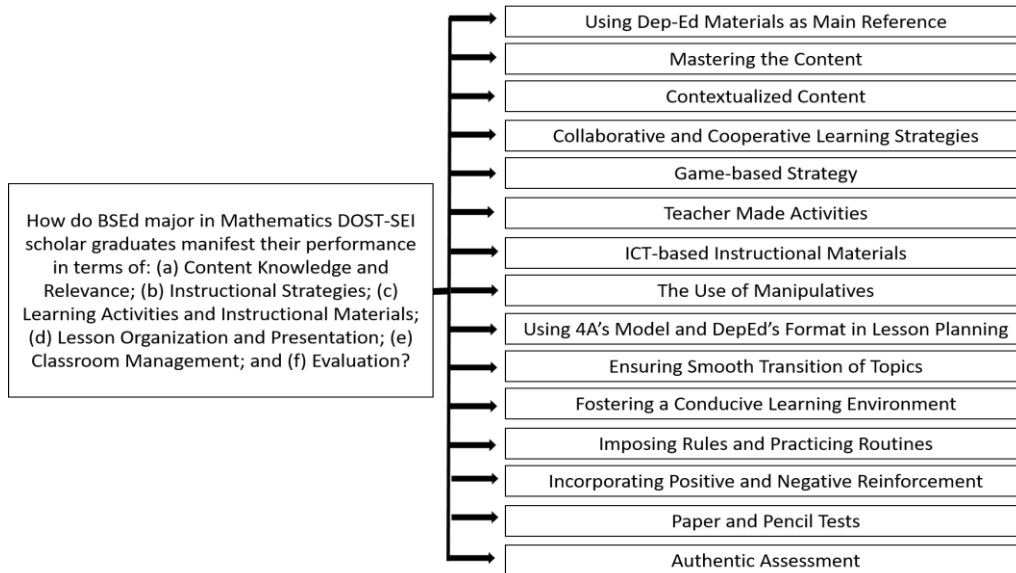


Figure 2: Scholar education graduates' manifestation of mathematics teaching performance through their self and department heads' evaluation

Discussion

Mathematics Teaching Performance of Scholar Education Graduates Based on their IPCRF (Individual Performance Commitment and Review Forms)

As reflected in Table 1, the study revealed that the overall mean rating of the informants was “very satisfactory” ($M = 4.49$, $SD = 0.24$). In addition, half of the informants received an adjectival rating of “outstanding” and the remaining half was rated as “very satisfactory”. This shows that the informants have very satisfactory performance as reflected by their IPCRF results. The low standard deviation results from different KRA's suggest that the ratings of the informants were close to each other or comparable. Moreover, this indicates that the range of scores given by their evaluators were almost the same or like each scholar.

This result is in consonance to the study of Catolos and Catolos (2017) on their study of teaching performance of selected public secondary school teachers in Rizal, Philippines where majority of the respondents have very satisfactory teaching performance. Sabio et al. (2020) recommended that a more subjective performance assessment tool must be utilized like those that involve participation of the students and the immediate superior of the concerned public-school teachers. Hence, IPCRF really served its purpose of evaluating the performance of teachers in terms of quality, efficiency, and timeliness. The objectives of IPCRF as indicated are the duties and responsibilities that

each teacher must do in service. This is a tool to check and balance if one is doing his duties diligently with quality, efficiency and on time (Canoma, 2017).

The Manifestation of Mathematics Teaching Performance of Scholar Education Graduates Based on their Self and Head's Evaluation

The scholar education graduates manifested their performance through the following: a) content knowledge and relevance through mastery of the content; b) instructional strategies by using game-based strategy; c) learning activities and instructional materials by using ICT-based instructional materials; d) lesson organization and presentation by using 4A's Model and DepEd's format in lesson planning; e) classroom management by imposing rules and practicing routines; and f) evaluation by using authentic assessment.

Mastery of Content

In general, scholar education graduates exhibit mastery of the content based on what the researcher had observed during their classes. Scholar graduates knew their subject matter because they delivered it fluently and had no difficulty in teaching their subject. They didn't even hold any papers or notes in the whole class duration since they really mastered what they were teaching. It was written on the observation guide of the researcher that scholar graduates were able to deliver the content of their lesson effectively. They were confidently standing in front of their class and able to answer all their student's questions about the lesson. In other words, they came into their class well-prepared. In addition, one of the teachers who accompanied the researcher during the classroom observation wrote that the graduate scholar was well-versed on the content. Another teacher also noted that the graduate scholar shown confidence in discussing the topic.

This result attested what McGraner et al. (2010) cited that in Mathematics, teacher's mastery is necessary for effective teaching to take place. The logic herein is that teachers who possess strong mathematical knowledge at great levels of depth and span are more likely to foster student's ability to review, conjecture and solve problems, while also able to more accurately diagnose and address students' mathematical misconceptions. Lapuz (2010) further emphasized that to be an effective teacher; one needs to understand the content that he/she teaches and knows how to explain that content in a manner that the students understand. There are teachers who do not know the content well enough to effectively teach it.

Game-Based Strategy

The study revealed that to make mathematics fun for the students, a game-based

strategy is an effective way. Some examples of games employed by scholars during the observation were “Represent Me”, and “Right or Left, where am I”, “Find your Partner”, and “Locate your Classmates”. Scholar graduates believed that students are active when the teacher incorporates games into the lesson. Game-based learning played important role in teaching by encouraging students to collaborate, communicate, interact, and work in teams.

It supported the findings of Felicia (2011) which concluded that games are effective in motivating and engaging students. Felicia’s research highlighted three key elements which contribute to the motivational outcomes of games: the design of the game, the medium used to deploy the game, and environmental scaffoldings such as support from teachers. The study further observed that games which produce motivational outcomes have clear goals, rules, multi-sensory cues, narratives, and a good balance between the educational and entertaining features. Active support from teachers in the introduction and running of the game also increased student motivation. Furthermore, games can enhance the social skills of students as well as improve their skills in understanding and solving problems (Kirikkaya, Iseri, & Vurkaya, 2010). Students enjoyed the inherent sense of challenge and motivation provided by games and boosting of confidence (Nisbet & Williams, 2009). Pedagogical retooling for teachers and curricular innovations like the use of interactive and innovative teaching strategies are indeed needed for the next normal in education (Nabayra, 2022c).

ICT-Based Instructional Materials

In terms of instructional materials, scholar graduates utilized new trends of using ICT-based instructional materials in their class such as Quexbook app which can be installed in their students’ cell phones. This contains lectures and examples in one subject especially in senior high school, Geogebra, Powerpoint presentations and softwares such as Selector Tool. Graduate scholars believed that technology nowadays is really an effective and efficient tool in teaching.

Results of the study supported the statement of Hudson, Kadan and Vasquez (2010) that they conducted a study wherein teachers used PowerPoints, web-based games, the internet, projectors, smart boards, calculators, videos, and music to enhance their mathematics instruction and the result of the study revealed that technology improves achievement, enables learners to be independent problem solvers, competent and creative thinkers, as well as effective communicators. To add, Nabayra (2020) found out that students appreciate the concepts of mathematics in nature when hybridized with videos as revealed by their learning experiences with the e-modules. Videos indeed served its purpose as a student-friendly, efficient, effective, and flexible instructional material integrating technology which would facilitate 21st century students’ learning at home through videos and maximize classroom time for more productive activities (Nabayra

2022a; Nabayra 2022b). Computer generated instructional materials (CGIM) are indeed recommended for the students to improve performance and achievement in mathematics (Sage & Bacio, 2019a; Bacio & Sagge, 2019b).

4A's Lesson Plan and DepEd Format

Lesson plan is vital in the teaching-learning process. It acts as a guide for the whole discussion and enables the teacher to reflect on what objectives they must achieve. Results showed that scholar graduates followed the DepEd format, which starts with reviewing a previous lesson or presenting a new lesson, establishing a purpose for the lesson, presenting examples of the new lesson, discussing new concepts, and practicing new skills, developing mastery, finding practical applications of concepts, and making a generalization and an evaluation. On the other hand, some of them were also following the 4A format of the lesson plan, which starts with Activity, followed by Analysis, Application and Assessment. They believe that with a lesson plan, they have a guide on how to present their lessons in class in a sequential and logical manner. According to the scholars, given that they are required to create a lesson plan every day in their school, they ensured that their lesson plans were well-made.

The results of the study support the claim of Kiplagat, Role, and Makewa (2012) that, in sequencing lessons, a lesson presentation follows a logical sequence. Information is presented in an organized manner, regularly checking the students' understanding, providing an opportunity for practice, giving frequent feedback, and concluding lessons by reviewing main points. Attributes such as using of lesson plan, teaching aids and classroom management capability showed positive association in teaching performance (Abdullah & Das, 2019).

Imposing Rules and Practicing Routines

Majority of the scholar graduates shared that in managing their classrooms, imposing rules, and practicing routines were needed to ensure discipline among students and a well-organized learning environment. Results indicated that scholar graduates still practiced the traditional way of imposing rules, which students needed to obey, lest they suffer a consequence, usually a punishment. On the other hand, having routines helped the students and teachers to quickly accomplish day-to-day tasks and allow fewer opportunities for disruptions.

During classroom observation, the researcher found that the scholar education graduates impose rules and regulations and practiced routines. Rules and regulations were posted on the walls or the bulletin boards. Among the rules that the researcher observed were proper behaviour inside the class, students were not allowed to go out of the classroom without asking permission, students raised their hands when they want to answer, the

teacher immediately called the attention of the student if they were noisy and not paying attention, and they students must clean the classroom before leaving. Additionally, one scholar practiced a command that whenever the class was so noisy, they were called by the name of their section, then students will answer “attention” — sounding like a military routine — for the entire class to pay attention to the teacher.

These results prove what Akram (2010) have found out—that discipline ensures how students behave when the teacher is teaching. He further notes that a classroom that is not well-organized results in discipline problems. This means that a teacher who has a classroom management action plan will have an organized and structured classroom where both the teacher and students will know what to do. On the other hand, Fuligni et al. (2012) found that daily classroom routines predict children’s opportunities for engagement in activities of various academic content and different kinds of instructional interactions with teachers.

Authentic Assessment

Other than the paper-and-pencil test, the scholar graduates also applied authentic assessment in evaluating their students’ performance. This includes performance tasks, asking questions, portfolio, projects, outputs and using infinite algebra/calculus software.

After observation, the researcher found that authentic assessment was evidently one of their ways to evaluate their students’ performance. They keep on asking questions all throughout the lesson to test the students’ understanding. This process is student-centred since it allows students to discover ideas with the questions as guides to get the correct information and share them in class. Performance-based assessment was also shown through activities conducted during the application part of the lesson. Lastly, the researcher also asked the scholar graduates to allow her to view samples of the projects, outputs, and portfolios their students created.

This confirms what Miller et al. (2009) found that portfolio assessment provides information for both formative and summative evaluation. Portfolio gives an insight into the progress the child is making and reveals the strength and weaknesses of the child, unlike traditional assessment. Both performance and portfolio assessment provide feedback to students, whereas traditional assessment does not. In other words, authentic assessment necessitates students using their prior knowledge, recent teachings, and skills to overcome real and complicated problems. For instance, students can create a project on a topic they have chosen, prepare a research report and present their end products for evaluators (DiMartino & Castaneda, 2007).

Conclusion

Scholar education graduates performed very satisfactory in all key result areas, or

KRA, of their IPCRF results. This implies that they have indeed internalized the value of excellence, sustained quality education, and embodied competence in the field of mathematics education.

The teaching performance of the scholar education graduates was laudable as evinced by their teaching performance in terms of content knowledge and relevance, instructional strategies, learning activities and instructional materials, lesson organization and presentation, classroom management, and evaluation. This shows that the scholar graduates have discovered new teaching strategies, different ways of teaching mathematics, used innovative materials and assessed students in various means not just to make themselves productive and excellent in mathematics education but to achieve quality learning for the students. It's only then that teaching becomes rewarding.

They have also notably embodied excellence in different aspects of their teaching careers personally and professionally as reflected on their achievements in personifying a culture of excellence to uplift the standard of mathematics education in the country. All of these indicate that the scholar education graduates have indeed lived according to what the DOST-SEI have expected of them. That is, to accelerate the development of excellent S&T human resources of the Philippines to ensure a steady, adequate supply of qualified human resources that can steer the country toward national progress.

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