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DISTANCE EDUCATION CHALLENGES OF SECONDARY SCHOOL MATHEMATICS TEACHERS

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Abstract: This research study delves into the challenges faced by mathematics teachers in the context of distance learning. Employing a descriptive quantitative research design, the study employed a survey questionnaire as the research instrument, along with descriptive and inferential statistics for data analysis. The findings indicate that the majority of teacher-respondents are female, in their middle adulthood, and possess significant experience in the teaching profession. The teachers face considerable challenges concerning the impact of distance learning on their instructional practices. However, the study did not find any significant difference in the challenges faced by mathematics teachers when categorized according to their demographic profiles. To address these challenges, teachers can benefit from in-service training courses focusing on distance education practices, methodologies, techniques, and material usage. Furthermore, online professional guidance applications can be implemented to enhance students' motivation and increase their engagement in the learning process. Addressing potential technical issues is crucial, and the presence of reliable internet infrastructure, access to computers, and computer proficiency among both teachers and students can contribute to minimizing such problems. Responsibility for resolving technical issues lies with relevant educational institutions, ensuring a smoother distance education experience.

Keywords **– Distance Education, Challenges, Mathematics Teachers**

I. INTRODUCTION

The surge in technological advancements has led to the widespread popularity of distance education, offering structured teaching and learning outside the traditional classroom setting (Moore & Kearsley, 2012). The outbreak of the COVID-19 pandemic compelled educational institutions to adopt remote learning techniques, ensuring educational continuity (Halmatov & Ata, 2021). While distance learning offers benefits such as accessibility and flexibility, it presents specific challenges for educators, particularly in the context of teaching secondary school mathematics. This study aims to analyze the unique difficulties experienced by mathematics teachers in remote education, focusing on administrative concerns, learner behavior, professional competency, and personal competency.

Even before the pandemic, distance learning was employed by various educational institutions to cater to homeschooled students, individuals with disabilities, and those at risk (Bilgiç & Tüzün, 2015). Institutions have chosen remote learning to increase access to education, develop skills, reduce costs, and address educational inequities (Moore & Kearsley, 2012).

However, math teachers face significant challenges in delivering effective instruction through online platforms. Administrative problems, including poor infrastructure and limited technology access, hinder the successful implementation of mathematics education in a remote setting (Ertmer et al., 2020). Additionally,

the lack of explicit rules and policies from educational authorities complicates the adoption of distance learning methods in mathematics.

Learner behavior plays a crucial role in the success of mathematics education in a remote setting. Learners may struggle with self-regulation, time management, and motivation without direct supervision from educators (Fernández et al., 2021). Moreover, disparities in technology proficiency and access to online resources contribute to uneven engagement in mathematical learning.

Professional competence is essential for math teachers to effectively manage distance education. They must become proficient in utilizing online teaching platforms, interactive technologies, and digital resources to provide meaningful mathematical learning experiences (Schunk et al., 2021). Adapting teaching methodologies for the virtual world and promoting active learning, collaboration, and problem-solving are critical for successful mathematics education.

Personal competency, which encompasses technology skills, digital literacy, flexibility, and resilience, is also crucial for distance education mathematics teachers (Ertmer et al., 2020). Overcoming obstacles and creating seamless learning experiences require teachers' ability to navigate online platforms and efficiently handle technical concerns.

To address these challenges, educators and policymakers must identify and resolve administrative concerns, learner behavior issues, professional competency gaps, and personal competency challenges faced by mathematics instructors in distance learning. Implementing policy reforms, providing robust professional development programs, and deploying necessary technology resources and support systems are essential for enhancing the delivery of distance learning in mathematics education.

This study seeks to investigate the specific challenges faced by mathematics teachers in distance learning. The findings will contribute to the existing knowledge and offer valuable insights for future researchers. The researcher intends to propose a model or intervention strategy to improve the delivery of distance learning for mathematics teachers, ensuring a more effective and inclusive learning experience.

II. RESEARCH METHODOLOGY

This study will employ a descriptive quantitative research design, utilizing instruments to gather responses from teachers regarding their profile variables and challenges faced by mathematics teachers in the context of distance learning.

Descriptive quantitative research aims to make observations and describe the results of those findings, providing a comprehensive account and delineating the components of a problem or phenomenon, without making inferences regarding causality (Mandell et al., 2015). This research method focuses primarily on answering the "what" rather than the "why" of the research topic. It aims to describe and quantify the various aspects related to the population under study, providing easily quantifiable information that can be used to derive statistical data (Jovancic, 2020).

By employing a descriptive quantitative research approach, this study seeks to gather data that will describe the profile variables of teachers and examine the challenges faced by mathematics teachers in the context of distance learning. The quantitative analysis of the gathered data will enable researchers to generate statistical insights and draw conclusions about the studied population.

The total population of respondents consisted of 45 Mathematics teachers. These teachers were employed across twelve schools located in four districts of Zambales: Cabangan, San Felipe, San Narciso, and San Antonio. The sampling approach involved including all available Mathematics teachers from the selected schools as respondents for the study.

The research instrument used in this study is a survey questionnaire, developed based on the work of Davis (2004). A questionnaire is a widely used research tool that consists of a series of questions designed to gather information from respondents (Waller, 2012).

The survey questionnaire for this study was divided into two parts. Part 1 aimed to gather information about the profile of the teacher-respondents. Part 2 focused on identifying the challenges faced by mathematics teachers in the context of distance learning. In Part 2, respondents were asked to assess the challenges using a four-point scale: 4 (Very Challenging), 3 (Challenging), 2 (Somewhat Challenging), and 1 (Not Challenging).

To ensure the validity of the instrument, the first draft of the questionnaire was presented to the panel of oral examiners from PRMSU Graduate School. The panel provides feedback and suggestions regarding the clarity, consistency, and suitability of the questionnaire items. Based on their input, amendments and revisions was made to finalize the research instrument.

In order to test the reliability of the questionnaire, a pilot test was conducted among Mathematics Instructors of President Ramon Magsaysay State University (PRMSU) in Iba, Zambales, as well as Mathematics Teachers of Bucao Integrated School in Botolan, Zambales. The responses obtained from the pilot test was analyzed using Cronbach's alpha, a statistical measure of internal consistency, to assess the reliability of the questionnaire.

Through these steps, the research instrument was refined and validated to ensure that it effectively captures the necessary data for the study.

III. RESULTS AND DISCUSSION

1. Profile of Teacher-Respondents

Table 1 presents the result on the profile of the Mathematics teacher-respondents.

Age. In terms of age, it can be noted that majority of the respondents with sixteen (16) or 35.56% belong to age group 24-30 years old; four (4) or 8.89% belong to age group 31-37 years old; eleven (11) or 24.44% belong to age group 38-44 years old; ten (10) or 22.22% belong to age group 45-51 years old; and only four (4) or 8.89% belongs to age group 52-58 years old. The computed mean age of teacher-respondents was 38.20 or 38 years' old which clearly signifies that the respondents are in their middle adulthood. According to DBMs Government Manpower Information System as of February 15, 2021, there is a total of 264,091 teachers with ages 35 to 44.

Sex. Most of the teacher-respondents with twenty-nine (29) or 64.44% are female while only sixteen (16) or 35.56% are male. The study findings are accounted on the fact that most of teachers who responded as part of this study were females compared to male. The data is in congruent with the World Bank data which shows that the percentage of women in the teaching profession appears to be rising steadily. 65.73% of teachers are females as of 2017 and 87.54% of teachers are females as of 2016 (Bongco & Ancho, 2020).

Number of Years in Teaching. In terms of years in teaching, majority of the respondents with twenty-one (21) or 46.67% are 1-7 years in teaching; fifteen (15) or 33.33% are 8-14 years in teaching; one (1) or 2.22% are 15-21 years in teaching; five (5) or 11.11% are 22-28 years in teaching; and only three (3) or 6.67% are 29-35 years in teaching. The computed mean number of years in teaching of teacher-respondents was 10.84 or 11 years. The findings signify that teacher-respondents gained adequate exposure in teaching profession. Teaching experience is positively associated with their teaching performance throughout their career. The gains from experience are highest in teachers' initial years, but continue for teachers in the second and often third decades of their careers (Padolsky, 2016).

Table 1. Frequency and Percentage Distribution on the Teacher-Respondents' Profile Variable

Profile		Frequency (f)	Percentage (%)
Age (Years) **Mean = 38.20 or 38 years old**	52 – 58	4	8.89
	45 – 51	10	22.22
	38 – 44	11	24.44
	31 – 37	4	8.89
	24 – 30	16	35.56
	Total	**45**	**100.00**
Sex	Male	16	35.56
	Female	29	64.44
	Total	**45**	**100.00**
Number of Years in Teaching **Mean = 10.84 or 11 years**	29 – 35	3	6.67
	22 – 28	5	11.11
	15 – 21	1	2.22
	8 – 14	15	33.33
	1 – 7	21	46.67
	Total	**45**	**100.00**

2. Challenges of Mathematics Teachers Towards Distance Learning

2.1. Administrative Issues

Table 2 presents the challenges of mathematics teachers towards distance learning in terms of administrative issues.

Table 2. Challenges of Mathematics Teachers Towards Distance Learning in terms of Administrative Issues

ADMINISTRATIVE ISSUES	AWM	Descriptive Rating	Rank
1. Obtain relevant information about the learner.	2.78	Challenging	4
2. Record keeping of information about the learners.	2.56	Challenging	5
3. Adapt the curriculum to meet the learner's needs.	2.96	Challenging	1.5
4. Adjust unit plans for academic year.	2.96	Challenging	1.5
5. Obtain funding for academic needs of the teachers and students.	2.93	Challenging	3
Overall Weighted Mean	**2.84**	**Challenging**	

The overall weighted mean of 2.84 indicates that the administrative issues identified in the research are collectively challenging. This emphasizes the importance of addressing these concerns to improve the effectiveness and efficiency of educational administration in the Philippines.

Excessive teacher workloads and essentially having to do more with less were major sources of work-related stress. An important point to make is that rarely are teachers able to reduce or eliminate the amount of duties and responsibilities for which they are held accountable. Standardized testing, special education paperwork requirements, budget reductions affecting teacher materials and additional personnel in the classrooms to assist with intense student behaviors, all serve to create stressful working environments for classroom teachers (OBryan, 2019).

2.2. Learner's Behavior

The challenges of mathematics teachers towards distance learning in terms of learner's behavior is shown in Table 3.

Table 3. Challenges of Mathematics Teachers Towards Distance Learning in terms of Learner's Behavior

LEARNER`S BEHAVIOR	**AWM**	**Descriptive Rating**	**Rank**
1. Keep the learners' attention during mathematics class.	3.22	Challenging	3
2. Encourage learners to complete all of the modules' activities.	3.31	Very Challenging	1
3. Provide feedback to assist learners in meeting their learning objectives.	2.87	Challenging	5
4. Teach learners to avoid inappropriate social behavior.	3.09	Challenging	4
5. Teach learners who have little or no prior knowledge of mathematics.	3.29	Very Challenging	2
Overall Weighted Mean	**3.16**	**CHALLENGING**	

The overall weighted mean of 3.16 suggests that managing learner behavior in mathematics classes is considered challenging by educators in the Philippines. This emphasizes the importance of addressing these challenges to create a conducive learning environment that maximizes student engagement and achievement.

Student misbehavior is a major concern for schools today. When student behaviors need to be addressed, classroom learning is interrupted. When learning cannot take place, teachers are unable to what they were hired to do, teach. School policies that address behavior seem to focus on extreme behavior issues rather than the day to day student misbehaviors teachers encounter in their classrooms (OBryan, 2019).

A study conducted by Skaalvik and Skaalvik (2015) explored the stress experienced by teachers in their profession. The research involved a participant group of 30 teachers, and the findings indicated that teaching, as a whole, was perceived as a stressful occupation. The study highlighted several key stressors reported by the participants.The researchers concluded that while teaching was commonly perceived as a stressful profession, the intensity of stress varied individually among the teachers (Skaalvik & Skaalvik, 2015). The study sheds light on the diverse stressors faced by teachers and emphasizes the importance of recognizing and addressing individual needs to improve the overall well-being of educators in the teaching profession.

2.3. Professional Competency

Table 4 presents the challenges of mathematics teachers towards distance learning in terms of professional competency.

Table 4. Challenges of Mathematics Teachers Towards Distance Learning in terms of Professional Competency

PROFESSIONAL COMPETENCY	**AWM**	**Descriptive Rating**	**Rank**
1. Determine the learner's capabilities in relation to mathematics..	2.87	Challenging	4
2. Create an action plan for non-numerates.	2.91	Challenging	3
3. Attend in-service training in meeting the educational needs of the learner.	2.56	Challenging	5
4. Sustain an active learning environment for the learner.	3.02	Challenging	2
5. Conduct an action research for professional development.	3.04	Challenging	1
Overall Weighted Mean	**2.88**	**Challenging**	

The study revealed that teacher-respondents face challenges in terms of professional competency related to the effects of distance learning, with an average score of 2.88. This finding highlights the difficulties educators encounter in accessing relevant professional development opportunities aimed at enhancing their knowledge and skills in addressing the diverse needs of learners. To support teachers in meeting the educational requirements of their students, it is crucial to offer professional development programs that focus on effective instructional strategies, assessment techniques, and differentiation.

In the context of distance education, it is imperative to cultivate in teachers the necessary skills, knowledge, and dispositions to thrive in a world that increasingly demands creative, collaborative problem solvers, and critical thinkers. Without a comprehensive understanding of these requirements and the availability of high-quality professional development opportunities grounded in best practices, both distance learning programs and distance learners themselves risk encountering challenges and potential failure (Commonwealth of Learning, 2008; National Staff Development Council, 2007; Dede et al., 2005a; Sparks, 2002).

Addressing the professional competency needs of teachers is pivotal in creating successful distance learning environments. By empowering educators through well-designed professional development initiatives, distance education programs can better equip teachers to excel in their roles and foster positive learning outcomes for distance learners.

2.4. Personal Competency

Table 5 shows the challenges of mathematics teachers towards distance learning in terms of personal competency.

Table 5. Challenges of Mathematics Teachers Towards Distance Learning in terms of Personal Competency

PERSONAL COMPETENCY	AWM	Descriptive Rating	Rank
1. Communicate with care to clarify concerns about the learner's modules and to remind parents of their role.	2.80	Challenging	5
2. Provide learners with remote assistance, particularly if there are technical issues with online learning.	3.20	Challenging	1
3. Monitor and evaluate learners' actual mathematical progress.	2.93	Challenging	3
4. To ensure learning, create activities that are aligned with the most important mathematical learning competencies.	2.87	Challenging	4
5. Provide technological equipment, including an internet connection, to complete assigned mathematics teaching tasks.	3.20	Challenging	1
Overall Weighted Mean	**3.00**	**Challenging**	

The teacher-respondents faced challenges with distance learning, particularly regarding their personal competency, as indicated by a mean score of 3.00.

During the Covid-19 pandemic, continuing education and training activities were significantly limited. However, several studies have explored the use, implementation, and evaluation of technology by teachers in the online environment. For instance, Uston, Karaolan-Ylmaz, and Ylmaz (2020) investigated the level of teachers' engagement in online educational activities and found that their willingness, self-confidence, and self-efficacy were at an intermediate level. Meanwhile, Kurtolu and Seferolu (2013) conducted a study to examine teachers' adoption of technology and discovered that while teachers were not far from embracing new-generation technology, they expressed feelings of inadequacy in applying innovative practices. They believed that additional training was necessary, especially considering the potential increase in individual responsibilities associated with such advancements.

3. Test of Difference on Challenges of Mathematics Teachers Towards Distance Learning when Grouped According to Profile Variables

Table 7. Summary of the Challenges of Mathematics Teachers Towards Distance Learning

	AWM	Descriptive Rating	Rank
A. Administrative Issues	2.84	Challenging	4
B. Learner`s Behavior	3.16	Challenging	2
C. Professional Competency	2.88	Challenging	3
D. Personal Competency	3.00	Challenging	1
Overall Weighted Mean	**2.97**	**Challenging**	

Administrative Issues. There is no significant difference on the challenges of mathematics teachers towards distance learning in terms of administrative issues when they grouped according to age, sex and years in teaching.

Learner's Behavior. There is no significant difference on the challenges of mathematics teachers towards distance learning in terms of learner's behavior when they grouped according to age, sex and years in teaching.

Professional Competency. There is no significant difference on the challenges of mathematics teachers towards distance learning in terms of professional competency when they grouped according to age, sex and years in teaching.

Personal Competency. There is no significant difference on the challenges of mathematics teachers towards distance learning in terms of personal competency when they grouped according to age, sex and years in teaching.

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