

Challenges encountered by pre-service mathematics teachers during classroom assessment

¹Frans N. Haimbodi and ²Hesekiel K. Iilonga

¹School of Education, University of Namibia, and ²Ministry of Education, Arts and Culture
¹fhaimbodi@unam.na and ²iihesekiel@gmail.com

Abstract

The Namibian school curriculum lists the development of numeracy and mathematical skills as one of the key areas in primary education. Classroom assessment has to be integrated with classroom instruction to measure attainment of objectives. This study was guided by the research question: what are the challenges encountered by pre-service mathematics teachers during classroom assessment? The qualitative case study used a questionnaire to collect data from 48 participants sampled purposively from a group of pre-service mathematics teachers in the third and final years of studies. The findings provide some insights regarding the challenges faced by pre-service mathematics teachers. Key findings on challenges include: Time management whereby participants spent most of their time writing summaries on the chalkboard and gave less time for writing activities. Participants also indicated that lack of resources was one of the challenges they encountered. They indicated that they did not have enough textbooks, posters and other teaching resources to use during classroom assessment. Furthermore, misconception of mathematics concepts was also a challenge, the participants indicated that learners did not understand mathematics concepts used during the mathematics lessons. The study recommends that pre-service teachers should use modern methods of teaching and assessment including computers when teaching in order to sustain learners' interest and help on improving time management. The study further recommends that the language policy be reviewed to accommodate incidences where learners are facing difficulties with comprehending assessment instruction in the medium of instruction.

Keywords: *challenges, assessment, assessment methods, pre-service teachers, mathematics*

Background

Assessment within the realm of education encapsulates an array of instruments and methodologies utilised by educators to appraise, document, and evaluate learning needs, progression, outcomes, instructional activities, curriculum, and the attainment of overarching educational objectives (Brown, 2022; The Glossary Reform Forum, 2015). As such, assessment assumes a pivotal role in facilitating the delivery of quality education across all educational tiers (Brown, 2022). Classroom assessment is a process of collecting and compiling data about students' achievement to improve the quality of instruction of teachers and learners, with the aim of empowering both teachers and learners to improve the quality of learning in the classroom. James (2015) argues that classroom assessment is an important aspect of learning and all teachers have to integrate in their teaching to enhance student's performance, and reporting results for accountability purposes. It offers feedback to teachers and learners on the quality of the learning performance supporting its on-going improvement (Roosali et al., 2019).

As per the findings of Davis and Gbormittah (2023), classroom assessment may be categorised as either summative or formative/continuous, contingent upon the specific objectives and intended utilisation of the assessment. Summative assessment serves the purpose of ensuring accountability, while continuous/formative assessment focuses on enhancing teaching and learning. Summative assessment primarily targets evaluating learning outcomes, whereas formative/continuous assessment aims to utilise assessment to enhance learning, encompassing both assessment as learning and assessment of learning (Monteiro et al., 2021). Continuous/formative assessment entails a persistent evaluation of students' performance over a designated period during their study (Stacey, 2016), incorporating grades from various activities such as homework, assignments, examinations, drills, and terminal analyses. Formative/continuous occurs continuously throughout teaching, in contrast to summative assessment, which typically occurs at the culmination of a course or instructional unit. Nevertheless, Namibian

students in lower grades, up to the ninth grade, have their final evaluation scores determined by a combination of Continuous Assessment and Summative Assessment.

These two forms of assessment must be coherently linked through a well-articulated model of learning (Black, 2018). Classroom assessment helps in improving quality education, it also determines to what extent learning has taken place with learners and how successful the teaching method was. The reason for this study arises from the experiences that the researcher has observed during classroom assessment during School-Based Studies (SBS) thus encouraging the researcher to conduct a study seeking to determine the challenges experienced by mathematics pre-service teachers during classroom assessment and the possible solutions. Mathematics is regarded as an essential tool for the development of science, technology and commerce (Ministry of Education Arts and Culture, 2015). Despite the significant role that mathematics plays in the society, pre-service mathematics teachers encountered challenges during classroom assessment for example, student understanding of content and issues related to planning. Classroom assessment is aimed at measuring the attainment of curtailed skills, however, when classroom assessment does not truly measure what it is expected to measure, then the outcome cannot be recognized to be trustworthy. Pre-service teachers do not use the theories they learned from training and face difficulties bridging the gap between theories and practical (Percy, 2012). Hence, this study examined challenges encountered by pre-service mathematics teachers while assessing learners in their classrooms. The study was guided by the following research question: What are the challenges experienced by pre-service mathematics teachers when assessing learners during School-Based Studies?

The findings of this study might provide solutions to pre-service mathematics teachers to overcome challenges they encounter while assessing in their classrooms. The study was limited to one of the six campuses of the University of Namibia which trains pre-service teachers majoring in mathematics. As a result, the findings are not generalizable to other campuses of the University of Namibia.

Literature

To gain insight into prior research on the challenges faced by pre-service mathematics

teachers during classroom assessment, the author conducted a literature review. This endeavour was aimed at preventing duplication of studies and, more importantly, to provide readers with a comprehensive understanding of the existing body of scholarly work on this topic. In a study conducted by Moussaid and Zerhouni, (2017), pre-service teachers encountered a myriad of difficulties. These difficulties included teaching methodology, lesson planning and delivery, a lack of teaching experience, managing the pace and transitions within lessons, contextualization, modelling, and a deficit in pedagogical content knowledge. Moussaid and Zerhouni, emphasized that pre-service mathematics teachers face hurdles in classroom management, primarily because their knowledge was more theoretical than practical. This observation is corroborated by Foncha et al. (2018), who noted that pre-service mathematics teachers often grapple with anxiety when it comes to managing the classroom. This anxiety can lead to significant problems with post-training classroom management.

The literature underscores several challenges experienced by pre-service teachers, with a significant concern being the struggle to apply theoretical knowledge in real classroom settings. This difficulty in bridging the gap between theory and practice has been recognized as a major issue, as highlighted by Percy (2012). Pre-service teachers often find it challenging to translate the theories they learn in their training programs into effective teaching practices. Another issue prevalent in the literature pertains to the availability and utilization of manipulatives in the classroom. Educators believe that physical objects aid in making learning enjoyable, engage students, and bridge the gap between abstract and concrete concepts. Manipulatives serve as valuable resources that encourage students to interact with learning in tangible ways. According to Ulla (2016), the scarcity of teaching resources can lead pre-service teachers to recycle strategies and methods to compensate for this deficiency.

In summary, the reviewed literature sheds light on the multifaceted challenges faced by pre-service mathematics teachers. These challenges range from theoretical knowledge application to classroom management and the utilization of manipulatives as essential learning resources. Understanding these difficulties is crucial in

developing effective strategies for teacher training and support.

Methodology

This study employed a qualitative approach with a case study design, chosen for its ability to capture a comprehensive overview, allowing the researcher to gain in-depth insights into the challenges faced by pre-service mathematics teachers during classroom assessment. The primary objective of this study was to investigate these challenges within the context of mathematics pre-service teachers. The target population consisted of all mathematics student teachers in their third and fourth years of study at one campus of the University of Namibia, as these students possessed first-hand experience in classroom assessment in the field of mathematics. Considering the impracticality of studying the entire population, a purposive sampling approach was employed, involving the selection of a representative subset of participants. Specifically, 48 pre-service mathematics teachers participated in the study, comprising 30 fourth-year students and 18 third-year students who completed a structured questionnaire. In order to elicit comprehensive responses and gather detailed information regarding the challenges faced by pre-service mathematics teachers during classroom assessments, a questionnaire was developed. The questionnaire contained items designed to solicit participants’ perspectives on the difficulties encountered while assessing mathematics in their classroom settings during their school-based studies.

Data collection was conducted using Google Forms, with the questionnaire being distributed to participants via WhatsApp. Participants were provided with ample time to complete the questionnaire, ensuring that their responses were well-considered. Once respondents had submitted their answers, the

collected data was subjected to analysis. The data analysis process followed a systematic sequence. Initially, the researcher thoroughly reviewed and familiarized himself with the collected data. Subsequently, the data was categorized and summarized into distinct groups. The third step involved examining the data to identify specific challenges encountered by pre-service mathematics teachers during classroom assessments and potential solutions. This study adhered to the research ethics guiding studies that deals with human subjects and maintained a strong commitment to ethical principles. Prior to participation, all respondents were informed about the research's objectives which were to establish the challenges encountered by pre-service mathematics teachers during classroom assessment. The participants were further informed of their right to withdraw from the study at any time without repercussions. Anonymity was preserved by refraining from disclosing participants' names on the questionnaire and by not revealing any identifiable participant information.

Results

This study investigated challenges encountered by pre-service mathematics teachers during classroom assessment. The results are organized based on the following sub-headings: demographic data of participants, types of assessments given by pre-service teachers, and the challenges experienced during mathematics classroom. The outcomes are delineated in accordance with the research question: What are the challenges experienced by pre-service mathematics teachers when assessing learners during School-Based Studies? Subsequent sections will elaborate on the findings pertaining to the research question.

Demographics

Demographic data about the participants collected as part of the questionnaire are presented Table 1.

Table 1: The demographic data of participants

Age		Sex		Year Group		Grade Taught			
		Male	Female	III	IV	4	5	6	7
≤ 20	4	16	32	4	20	4	7	10	9
21 – 25	36								
26 – 30	5								
30+	3								
Total	48	16	32						

Table 1 shows the age distribution of the respondents as follows: four respondents were 20 years old or younger, thirty-six were in the 21-25 age group, five were 26-30 years old, and three were over the age of 30. Among the participants, 16 were female and 8 were male. In terms of academic year, four respondents were third-year students and twenty were fourth-year students. During SBS, the respondents were assigned to teach different grade levels: four taught grade 4, seven taught

grade 5, ten taught grade 6, and nine taught grade 7. Some students taught more than one grade.

Types of assessment given by pre-service teachers

The respondents were asked to indicate the types of assessments they used during SBS. A condensed overview of the analysis is outlined in Figure 1.

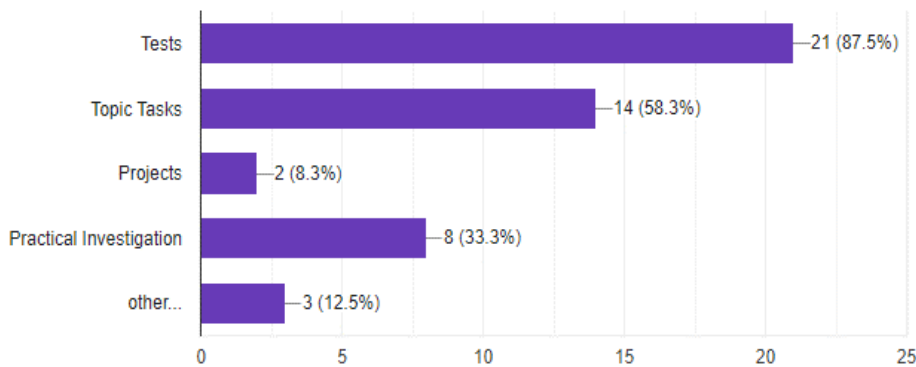


Figure 1: Types of assessments administered by pre-service teachers

In Figure 1, about 87.5% of the respondents indicated that they used tests to assess their learners, 58.3% used topic tasks, 8.3% projects, 33.3% practical investigations and 12.5% used other methods to assess their learners.

Challenges associated with implementation of classroom assessment

The pre-service mathematics teachers responded to an item seeking for challenges they encountered while conducting classroom assessments during their tenure at SBS. The specifics of these challenges are delineated in Table 2.

Table 2: Challenges encountered during classroom assessment in Mathematics

Challenges	N	%
Inadequate assessment materials, e.g. math set, exercise books etc.	40	83.3
Assessment takes much of my time due to overcrowded of classrooms	34	70.8
Inadequate skills to align assessments with learning objectives	18	37.5
Some of the students do not submit their work for marking	30	62.5
Learners disrupting lessons	38	79.2
My learners' attendance to school is poor	8	16.7

Table 2 shows that the majority of participants (83.3%) reported that many learners lacked essential assessment materials such as mathematical sets, exercise books, pens, pencils, etc., either provided by the school (government) or by parents. This deficiency significantly impacted assessment practices within these educational institutions, with the absence of materials like exercise books, report cards, graph sheets, and answer booklets being particularly detrimental. Moreover, 70.8% of participants highlighted the challenge of classrooms being overcrowded, resulting in time constraints for tasks such as marking and

administering assessments promptly. This finding underscores the consensus among most pre-service mathematics teachers that classroom assessments consume excessive time due to larger class sizes (1:35 ratio) than what is considered optimal for effective teaching and learning at the senior primary phase. The issue of overcrowding in classrooms leads to diminished focus on assessing students' learning, as teachers must allocate more time to grading individual activities. Additionally, the study revealed that 37.5% of participants lacked the knowledge to align assessment activities with the learning

objectives outlined in the syllabi, while 62.5% identified the challenge of learners failing to submit their work for evaluation. Furthermore, 79.2% of participants indicated that some learners are disrupting the lessons and they are finding it difficult to control them while, minority of participants (16.7%) mentioned instances where some learners were frequently absent, posing difficulties for pre-service mathematics teachers in assessing all students adequately.

Discussions

The objective of this study was to investigate the challenges faced by pre-service mathematics teachers during their School Based Studies (SBS) phase. Through the implementation of a structured questionnaire, numerous significant challenges were revealed. Although all participants acknowledged deriving benefits from the SBS experience, they also encountered challenges that potentially impeded their professional development and understanding of the teaching vocation. Hence, it is imperative to address and surmount these challenges to prevent any adverse impact on aspiring teachers' perceptions of their future profession. The finding of this study might educate pre-service teachers on possible solutions to the challenges encountered by pre-service teachers during classroom assessment. The researchers found out that the main problem that most student teachers experienced is time management where they spend most of their time on writing summaries on the chalkboard and give less time for writing activities and some learners are slow in writing. The researchers also found out that many student teachers experience challenges with the classroom management as it is also stated by Foncha et al. (2018) that pre-service Mathematics teachers experience great deal of anxiety by managing the classroom and this causes serious problems with their post training classroom management, it is also supported by Moussaid and Zerhouni, (2017) that student teachers only have theoretical knowledge rather than practical knowledge. Teaching methods misconception of mathematical concepts and lack of resources as participants indicated that there are no resources to support their teaching e.g., text book that can be used by learners, this supported by Ulla (2016) that lack of teaching resources prompted pre-service teachers to recycle strategies and methods.

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It was also discovered that some learners are not handing their exercise book to the pre-service teachers for marking, while some learners are absenting themselves from school. When learners fail to submit their exercise books, it results in incomplete assessment data, which can hinder teachers' ability to accurately gauge students' progress and identify areas where additional support may be needed, while student absenteeism further exacerbates the assessment challenge by creating gaps in learning continuity which is making it difficult for pre-service teachers to assess students' mastery of concepts or skills when they are frequently absent from class. Similar results about learners not handing their books to teachers and absenteeism of learners were reported by Sethusha (2012). In summary, this study investigated the challenges experienced by pre-service mathematics teachers during their School Based Studies (SBS). Twenty-four participants from a single campus of the University of Namibia were involved in the study. The findings revealed several key challenges faced by pre-service teachers, including overcrowded classrooms, insufficient skills to align assessments with learning objectives, non-submission of work by some students, disruptions in lessons caused by learners, and poor attendance among students.

Conclusion

The purpose of this study was to investigate the challenges encountered by pre-service mathematics teachers during classroom assessment. Based on the findings of the study it can be concluded that mathematics pre-service teachers who participated in this study tended to utilise a higher frequency of topic tests, topic tasks, projects, and investigations for assessing students' learning. Furthermore, the findings indicate that pre-service mathematics teachers face significant challenges in managing classroom time effectively and maintaining classroom discipline. They often spend too much time writing summaries on the chalkboard, leaving insufficient time for student activities. Additionally, they experience anxiety in managing classrooms, which is compounded by a lack of practical classroom management skills. Overcrowded classrooms further exacerbate these issues, making it difficult for pre-service teachers to manage time and maintain classroom control.

Recommendations

Based on the discussion and findings from the study, the study makes the following recommendations to help mitigate the challenges faced by pre-service teachers, thereby enhancing their professional development and overall teaching experience:

- Enhanced practical training and support for classroom management: To address the significant challenges pre-service teachers face in classroom management, it is crucial to provide them with more practical training and ongoing support. This can be implemented through workshops and simulated classroom environments where pre-service teachers can practice managing a classroom under the guidance of experienced educators.
- Improved access to resources and efficient time management training: Addressing the issues of limited resources and time management can significantly enhance the effectiveness of pre-service teachers. By ensuring that schools and training programs provide adequate teaching resources, such as textbooks, instructional materials, and digital tools, to support effective teaching and learning. In addition, the University's School of Education should conduct workshops focused on time management skills,

helping pre-service teachers learn how to balance different teaching activities, such as lesson planning, delivering content, and assessing student work, more effectively.

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