Research Article

Assessing Students' Learning: Revisiting Challenges of Secondary Mathematics Teachers in Bicol Region, Philippines

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ABSTRACT

The COVID-19 pandemic led to a sudden paradigm shift in education worldwide. To ensure that education would be undisrupted, many countries, including the Philippines, shifted from the usual face-to-face classes to distance learning modalities such as modular, online and blended. With these rapid changes, mathematics teachers were confronted with a lot of uncertainties. To investigate the challenges they encountered in assessing their students' learning during the remote setting, this study used a descriptive research design. Data were gathered through online questionnaires in Google form and informal interviews among 268 secondary mathematics teachers from the different divisions in Bicol Region, Philippines. Thematic analysis was utilized in the analysis of qualitative data. Results show challenges in terms of the quality of outputs, materials and resources, students' performance and feedback mechanism. On a positive note, they regarded the pandemic as an opportunity for professional advancement and pedagogical flexibility.

Keywords: *Assessment, COVID-19, Distance learning, K to 12 Curriculum, Mathematics*

Introduction

The COVID-19 pandemic had massive impact on teaching and learning activities worldwide, including the Philippines. During the height of the pandemic, UNESCO (2020) reported more than 188 countries worldwide opted to close schools, affecting 1.6 billions of students and 63 million basic education teachers. This important decision was made by world leaders and health authorities to save lives and to minimize the spread of the virus.

In response to this challenging era in education, Gouëdard et al (2020) proposed recommendations for effective implementation of education amid the pandemic. They recommended that policy measures must be coherent with the environment and students. Some of their recommendations include looking into the available resources which can be utilized in schools and homes, intensifying cooperation between education partners, ensuring health, welfare and assessment policies in the

response, using adequate mode and support for education delivery, strategic monitoring, and establishing communication strategies. Recommendations were also provided by Reimers et al (2020) to address education issues due to the pandemic through remote learning strategies. Richer countries, according to him, which can afford the needed resources, can move to online learning strategies while those countries which belong to middle income and poorer countries, can opt to have several delivery modes in lieu of online distance learning.

In the Philippines, the Department of Education issued guidelines on the adoption of Basic Education Learning Continuity Plan in light of the COVID-19 public health emergency. The said department order highlighted that no face-to-face classes will be held unless everyone is safe from the virus but learning opportunities will be provided through blended distance learning modalities and reducing the contents by considering the most essential learning competencies identified for each subject area in the different levels. Among the different learning delivery modalities presented were face-to-face, distance learning, blended learning and homeschooling. The face-to-face is only feasible to very low risk areas with no history of infection. The distance learning includes modular distance learning, online distance learning through the use of learning resource management or any technology available, DepEd Commons and DepEd Learning Resource Portal and TV or radio-based instruction. Blended learning is a combination of face-to-face and online distance learning, modular or tv and radio-based instruction while homeschooling is for those which can be facilitated by qualified parents, guardians or tutors who have relevant education on home schooling (DepEd, 2020).

On the other hand, Duterte, former president of the Republic of the Philippines, in one of his press briefings, voiced his uncertainty for distance learning in the country saying that the country was not ready for this (Magsambol, 2020). However, Briones, former secretary of the Department of Education, pronounced that education must not be put to a halt and that technology is not a problem as other options are available, mentioning that schools will be providing printed modules for students. She also stressed that the learning modalities included in the Basic Education Learning Continuity Plan were not new as these have been utilized for the longest time (DepEd, 2020).

With the decision of the Department of Education on the opening of classes in 2020, the parents and students also expressed their doubts and fears on factors including finances, parents or guardians incapable of helping their children learn at home, and resources. Issues on internet and availability of devices surfaced the debate on whether to accept or not the soundness of the policy. This was supported by teachers mentioning it would put those poor students at risk of not learning (Magsambol, 2020). These doubts were also expressed by Reville, former secretary of Education for Massachusetts, stating that this situation may heighten inequities in education due to financial and resource disparities but also expressed optimism that this might bring innovations and other opportunities for growth and development (Mineo, 2020).

A year or more after the implementation of the different learning modalities in different parts of the world, researchers looked into several areas of concern. Tanujaya et al (2021) looked into the problems encountered and solutions implemented by teachers and students in mathematics learning. They highlighted the issues on accessibility to ICT equipment and the teachers' and students' ability to use ICT in online mathematics learning. They also presented that parents at home do not all have the capability to assist students and the possibility of the students not understanding the concepts although they presented answers to questions. They also mentioned interaction as one of the issues in online learning affecting the giving of feedback and assessment. One way of addressing this issue was being innovative so that teachers could keep track of their students' learning.

In the Philippines, Alea et al (2020) reported that several basic education schools lacked facilities and resources including training of teachers for distance learning. Additionally, Talimodao and Madrigal (2021) explored on the quality, implementation and challenges of implementing printed modular

distance learning in the Philippines. The challenges identified were related to assessment, activities, parent's capacity to assist their children in learning, parents' presence in following up and getting and returning the learning materials. These, according to them, have implications to school administrators as teachers need support and instructional supervision to effectively implement printed modular distance learning. This devised setup in education posed challenges for education leaders, teachers and students and other stakeholders. Mathematics teaching and learning, in particular, was one of the most vulnerable in a disrupted learning environment, especially for basic education in the Bicol Region where almost all schools utilized modular printed learning modality.

With the paradigm shift in pedagogy, assessment, which involves gathering pieces of evidence of students' learning, was one of the key aspects of the teaching and learning process which was greatly affected. Changing the traditional face-to-face classroom instruction to remote teaching also entailed changes in how to effectively assess students' learning. The novelty of the experiences presented numerous challenges on the part of the teachers including issues on how to design and implement assessment tools and tasks, and to ensure that pieces of evidence gathered from these mechanisms were reliable and authentic. Their experiences regarding this aspect in mathematics teaching and learning during the COVID-19 pandemic were worth of inquiry, hence, the conduct of this study.

Methods
Research Design
This paper employed both quantitative and qualitative approaches. Specifically, the descriptive research design was used to ascertain mathematics teachers' challenges in terms of assessing students' learning in mathematics in remote settings during the pandemic. To gather data, an online questionnaire in Google form was used as a primary data-gathering instrument. This was posted on the Facebook page of the Regional Center for Science and Mathematics Education Development and the personal account of the researcher after the conduct of the study was approved by the Region V DepEd

Office. The link to the questionnaire was also shared to the program supervisors in the different divisions in Region V who shared the same to their secondary mathematics teachers. Personal emails were also sent to the supervisors and the target respondents. Informal interviews were also conducted among the mathematics teachers who expressed their willingness to participate in the study through call or chat.

Analysis of Data
In the analysis of quantitative data, descriptive statistics was utilized. For the qualitative data gathered, inductive coding was used. Thomas (2003) described the process of inductive coding in five steps. First, preparation of raw data files or what he calls as data cleaning. After collecting and downloading the responses as an excel file, these were organized checking into the font size and spacing for readability. These excel files were then printed segregating the responses for each research objective. Next, close reading of text. In this stage, the researcher read the responses in detail to have a full grasp of the details of their responses and to look into possible themes or categories. Responses were read for each research aim, one at a time. In the third stage, the researcher created themes or categories derived from the responses after going over them several times considering the research aims as larger level category and the lower level categories derived from the details found in the responses. Different strategies were used in coding such as using words or phrases, letters, highlighting using different colors and underlining. Next, the researcher reread the responses and the initial coding to decide on some responses which were found to possibly belong to two or more codes.

For those responses which were not coded, these were highlighted to be decided in the latter part, either to exclude or to be coded after thorough analysis. The last stage was refinement of the codes or categories and revision. Some low-level categories were found to have similarities thus were subsumed into a bigger category. These stages were repeatedly performed for the different research objectives and also for the transcripts of the interviews.

Research Instrument

The instrument used was a validated online questionnaire developed by RCSMED team. The questionnaire was composed of personal background, educational background, teaching experience, trainings attended for remote learning, experiences, problems encountered, and assessment strategies used in teaching mathematics. It was designed and developed through reading of relevant references, interview with teachers, drafting of initial items, critiquing of the draft by 5 teachers consisting of 3 master teachers from DepEd, revising the first draft, subjecting the questionnaire to validation and try-out and encoding the final instrument. During the informal online interview, the open-ended questions given in the instrument were used.

Respondents

The respondents of the study were 268 secondary Mathematics teachers in the different divisions in Bicol Region consisting of 172 female and 96 male. The following is the distribution of the respondents from the different divisions: Albay – 44, Camarines Norte – 9, Camarines Sur – 23, Catanduanes – 45, Iriga City – 13,

Legazpi City – 15, Ligao City – 14, Masbate – 20, Naga City – 9, Sorsogon Province – 18, Sorsogon City – 13, and Tabaco City – 45. Additionally, 48(17.91%) were assigned in small schools, 73 (27.24%) in medium schools, 55 (20.52%) in large schools and 92 (34.33%) in mega schools.

Results and Discussion

Assessment plays a vital role in educational settings and is used to measure different educational variables of interest. It is not only beneficial to teachers and administrators but to students as well, which includes better communication, teacher-student involvement, and the potential to improve student learning. With the COVID-19 pandemic which affected the educational system, it became an opportunity to transform existing mechanisms by looking into alternative assessment strategies.

Assessment Strategies and Tools Utilized by Mathematics Teachers

Teacher-respondents were asked about the assessment strategies and tools they utilized during the remote instruction and the result is illustrated in Figure 1.
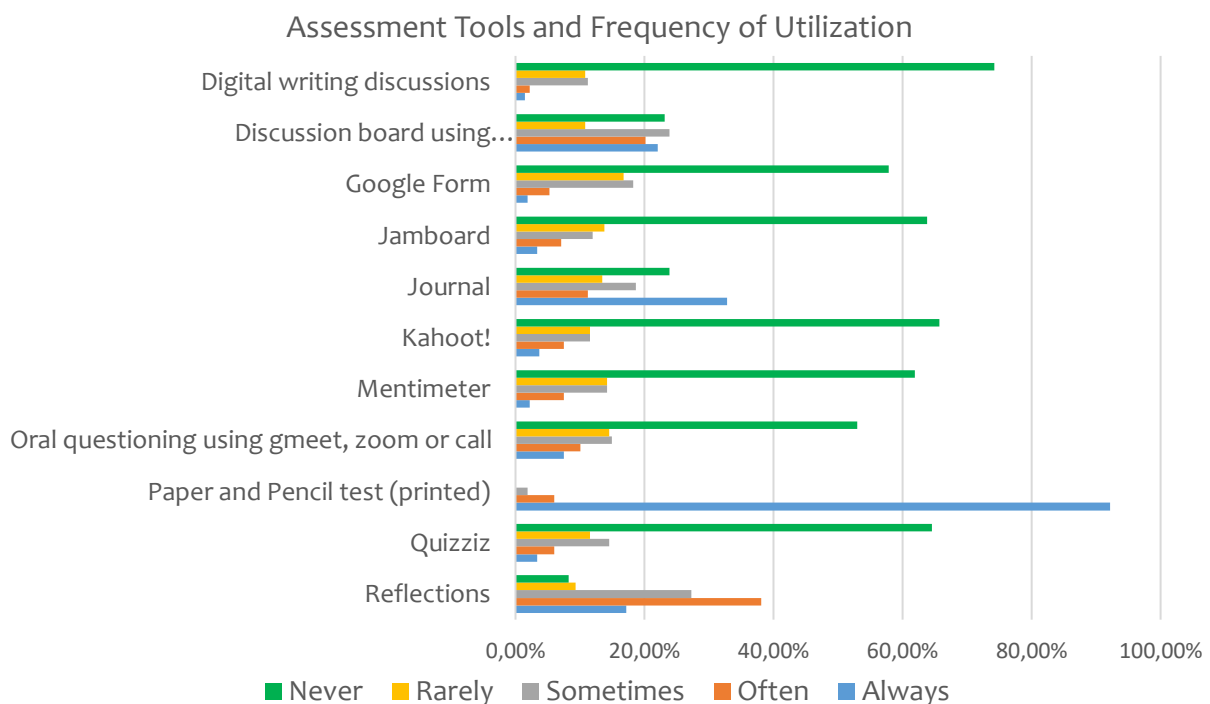

Figure 1. Summary of assessment strategies and tools used by mathematics teachers during the pandemic

From the teachers' responses, the most frequently utilized assessment strategy during the remote teaching was that of the paper and pencil tests. The formative assessments as well as the summative were in the form of written paper and pencil tests (92.16%). Conventionally, journals and reflections were also oftentimes employed along with the written paper and pencil tests. Third in the rank was the use of discussion boards such as Facebook messenger and Google classroom where they reported that students can interact asynchronously, any time, that they are online. Notably, digital tools were seldom utilized especially those which require internet connectivity like Kahoot! Quizziz, Jamboard, Mentimeter and other applications.

With the shift from face-to-face classes to different distance learning modalities, a shift was also done in terms of assessing students' learning. In the Philippines, guidelines were provided to assess students' learning during the pandemic, eliminating quarterly examinations in the reporting of grades. Guidelines were also provided to ensure flexibility in assessment considering the students. As such, mathematics teachers were encouraged to be

innovative in their assessment strategies they designed to cater to their students' needs. However, the results show that the paper and pencil test was still the most and frequently utilized strategy during the remote teaching. This was affected by factors such as the difficulty of students in terms of internet connectivity and access to devices or gadgets in the Philippines specifically at the remote areas in the region. The use of online strategies in assessing students' learning was less popular due to difficulty in internet access which is supported by Clarete (2019) who reported that among the Asia-Pacific countries, the Philippines has the second slowest internet connectivity. This scenario was also observed in the Bicol Region, specifically in remote areas.

Challenges Encountered in terms of Assessing Students' Learning

Code categories concerning the challenges experienced by mathematics teachers in terms of assessments consisted of students' low performance, quality of outputs, assessment tools, and feedback mechanism as illustrated in Figure 2.
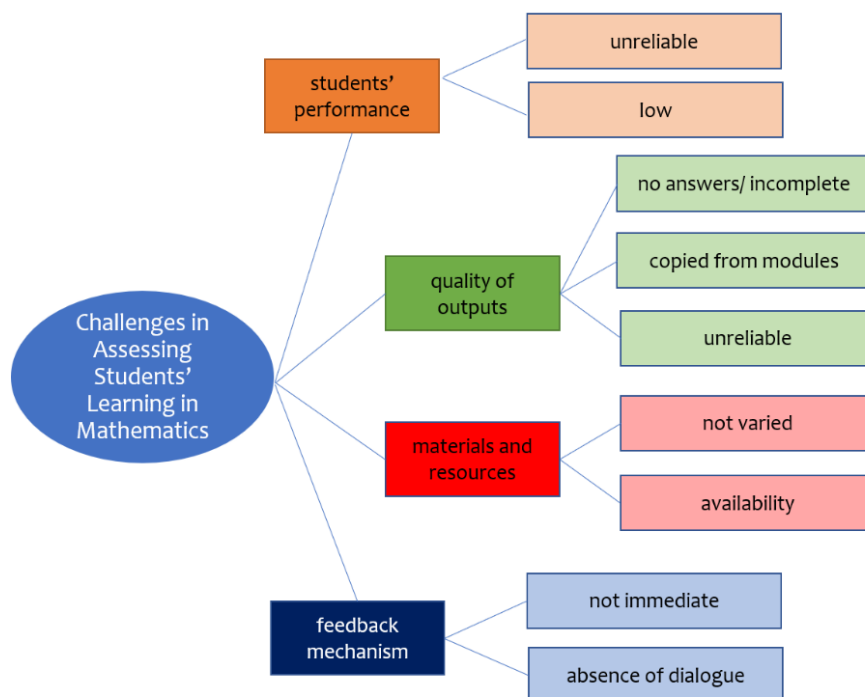

Figure 2. Code categories and sub-categories of challenges in Assessing Students' Learning

Quality of Outputs

The biggest chunk of teachers' responses, 36.65%, with regards to the challenges they encountered in terms of assessment during the pandemic was the quality of outputs submitted by their students, which in total consisted of 243 comments. In most cases, their comments talked about "*the answers of the students were just copied from the modules*" since the answers were included in the materials. They also noted that outputs only consisted of those with answers found in the material and those which required solutions were left blank or without answers. Another major concern during the pandemic was the reliability of the submitted outputs. Teachers noted that the works submitted were not authentic due to different handwritings and inconsistency of the results. Some, according to them were prepared by either the students' siblings, parents or tutors as evidenced by the unreliable results they obtained from the activities in the modules and those of their summative tests.

Feedback Mechanism

Providing feedback is one of the salient factors in assessment. This factor emerged as one of the categories among the challenges in assessing students during the pandemic which comprised 27.90% of the total responses. One sub-category under this is the immediacy of feedback as "*checking and feedbacking of outputs are delayed due to submission of reports and other extra workloads of teachers.*" Additionally, feedback, according to them, was only limited to students who keep on asking questions through online means, thus most of students' difficulties were not addressed properly.

Absence of dialogue between students and teachers was also seen as one of the challenges as "*communication is hard for the students having no gadgets or internet connection.*" One response related to this was, "*I've encountered a student having difficulty in learning the lesson. He cannot contact me because he doesn't have phone and because our school doesn't permit students to go, same with us teachers who were not permitted for a home visit.*"

Students' Performance

This category consisted of 20.67% (137 comments) of the total responses and was one of the major concerns of mathematics teachers during the pandemic. Teachers reported that students performed poorly in the different topics as evidenced by their low scores in the different assessment tools they provided to their students both formative and summative. Some teachers also highlighted that the retention rate of the students was very low which greatly affected their performance during the pandemic. One teacher wrote, "*The scores are very low. Mathematics is difficult to understand when they only rely on printed modules. They need a teacher for the explanation and elaboration of the lesson.*"

Another factor seen as contributory to students' low performance was their poor comprehension using English language. An example of a response is, "*There is a big number of students who find it hard reading and comprehending the materials due to the medium which is English. Sometimes giving assignments that require reading is not applicable or I find it hard to let them achieve the skill in solving word problems, in particular. Learners can understand if word problems are translated in Filipino or in their dialect.*"

Additionally, unreliable performance, was also one sub-category under this challenge. One teacher wrote, "*One quarter, students got high scores in the test, then in the next quarter they got very low already. It was hard to predict whether they learn or not and who is answering their works.*" They also highlighted cheating as one of the issues of unreliable performance during remote learning, particularly in online assessment. They also noted that students' answers from their assessment tasks were sometimes directly lifted from books or online sources.

Materials and Resources

This category was also considered a challenge in terms of assessing students' learning and consisted of 14.78% of the total responses. Teachers wrote that the use of "*one size fits all*" did not yield reliable results as assessing the learning of students through paper and pen tests only without knowing them personally

and without seeing how they perform inside the classroom may be different. Other responses highlighted the difficulty in using other assessment strategies due to the difficulty both in access to the internet and the availability of gadgets among students. According to some responses, digital assessment is not applicable because of poor internet connection and limited gadgets for the students. They reported that in some cases where they used online tools like Google form or Kahoot! their students would complain due to poor signal in their area or that they do not have data for access.

The biggest challenge in assessing students' learning remotely was that of the quality of outputs specifically the reliability of the assessment results as it was difficult to monitor how they were doing the assessment tasks assigned to them (Sahu, 2020) and the authenticity of their outputs (Pokhrel & Chhetri). Research report mentioned that the availability of helpful formative assessment and timely feedback were crucial part of remote learning (Doucet et al, 2020). This issue has also been tackled in some papers (Nguyen et al, 2020: Bilen & Matros, 2021) mentioning cheating as one of the issues of remote learning, particularly online assessments. The issue on unreliable performance has negative impact in education as unreal and inaccurate information derived from students could give teachers wrong information about them.

The students' low performance was attributed to several factors such as the nature of mathematics itself which makes it difficult to explain the concepts to learners without the teacher's physical presence (Ni Fhloinn & Fitzmaurice, 2021; Sukna & Priatna, 2021) , issues on internet and devices (Pocsova et al, 2021; Sukna & Priatna, 2021) which make it difficult to have interactive learning environment and personal contact (Wahyuningrum & Latifah, 2020; Ni Fhloinn & Fitzmaurice, 2021; Barlovits et al, 2021), students' behavior (Sari & Nayir, 2020), lack of support from parents or guardians at home including the environment they are in (Pokhrel & Chhetri) and a teacher-centered learning (Wahyuningrum & Latifah, 2020; Donmus Kaya & Kükey, 2022). Moreover, in the absence of proper feedback in learn-

ing, opportunities for addressing misconceptions and improving learning will not be possible. Alongside these challenges, the teachers also acknowledge some opportunities available to them during the pandemic such as support from the different stakeholders and the opportunity to develop their creativity and inventive minds.

Conclusion

The sudden shift from the traditional face-to-face instruction to remote learning modalities caused by the pandemic posed challenges to both teachers and students. The teachers' experiences in assessing students' learning in mathematics reveal issues concerning students' low and unreliable performance, limited assessment tools and materials, poor feedbacking and reporting of results and authenticity of students' works. Also included are the students' low performance, limited assessment tools and poor feedbacking and reporting of results.

It is recommended that reforms in education such as improvement in technology infrastructure including access and interventions and professional development activities related to assessing students' learning be made to improve the teaching and learning of mathematics in times of disruptions and emergencies. The findings of this research suggest appropriate assessment policies in place during remote instruction so as to ensure sound assessment practices and results. Further studies on effective assessment practices in mathematics during disruptions be conducted.

Acknowledgement

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