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Research Article

Alternative Assessment Strategies and Challenges in Mathematics Instruction at MSU-Sulu during the COVID-19 Pandemic

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ABSTRACT

A shift in learning modalities has been brought about by the pandemic. This is true in regard to all subject areas. Even higher educational institution is faced with unprecedented challenges due to this. However, as many papers focused on alternative learning modalities, few centered on the alternative assessment strategies, which would give a necessary perspective on how the students are being assessed and how they view these assessment strategies. Hence, the researcher opted to conduct this study entitled Alternative Assessment Strategies and Challenges in Mathematics Instruction in the time of the COVID-19 Pandemic. The study mainly centers on Mathematics due to the nature of the subject that usually makes use of drills in measuring the capability of students to solve problems relating to different fields of the subject, as well as considering that it is perceived to be one of the difficult subjects even in higher education.

The study identified the alternative assessment strategies used in Mathematics instruction during the pandemic as well as the challenges associated with them. It was also assessed whether there were factors affecting the use of the strategies. The study also looked for the association between the perceived efficiency of the alternative assessment strategies and the challenges faced by the students.

With the use of a cross-sectional survey design, two survey questionnaires, and various statistical tools to analyze the data, such as arithmetic mean, weighted mean, t-test, one-way analysis of variance, and correlation analysis, the problems of the study were answered.

The study found that there were two types of alternative assessment strategies used: summative and formative. The alternative assessment strategies used were not influenced by certain factors such as gender, home college/ department, educational attainment, and years in teaching. Furthermore, it was revealed that both faculty and students were challenged with the employment of alternative assessment strategies in Mathematics instruction. Also, the students'

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perceived level of efficiency of the alternative assessment strategies was positively influenced by the challenges they met.

Thus, the researcher concluded that the employment of a variety of alternative assessment strategies is essential in Mathematics even during the pandemic. Despite the challenges associated with the employment of the said strategies, it is still perceived to be efficient by students that challenges during assessment should not hinder the process.

Keywords: *Assessment Strategies, COVID-19 Pandemic, Mathematics Instruction*

Introduction

Faced with the unprecedented shift to alternative learning modalities, higher education institutions around the world, which were accustomed to residential or face-to-face learning, like Mindanao State University–Sulu, are now experiencing drastic changes in relation to the mode of instruction and delivery of quality education amidst the COVID-19 pandemic.

These changes are to ensure that health protocols suggested by the World Health Organization (WHO) are observed, the Heal as One Act of the present Duterte Administration is not violated, and ensuring all MSU-Sulu stakeholders are safe and healthy. Hence, the traditional approach to teaching is simply no longer possible, so the usual measures promote authentic assessment and suitable evaluation of students' learning outcomes.

In practice, assessment of students is done to discern if they have reached the goals of the learning tasks. It is vital, therefore, for teachers to closely check the progress of their students despite the COVID-19 pandemic to guarantee the continuity of education for their students. However, the current strategies that require the teacher and the students to be in a single room, which are no longer permissible during the pandemic and face-to-face assessment, are no longer a possibility. As an educational countermeasure, the MSU-Sulu college faculty have started alternative assessment strategies to better see the performance of their students following certain flexible learning options provided by MSU Main Campus and its Campus Academic Personnel Committee. Moreover, it is predicted that the alternative assessment strategies being applied in the so-called "new normal" resulted in certain challenges.

In view of these circumstances, the researcher was prompted to explore the alternative assessment strategies used by MSU faculty members in Mathematics instruction during the time of the COVID-19 pandemic. The present study also aims to answer the problems, such as: (1) Which of the applied alternative strategies are effective in mathematics instruction as perceived by the students? (2) What are the challenges met by MSU Faculty in employing the said strategies? (3) Is there a difference among the strategies employed between male and female faculty members, their home college or department, their educational attainment, and years in teaching? Lastly, (4) Is there a significant impact of the challenges met by MSU -Sulu Faculty members on the effectiveness of mathematics instruction?

Due to time and financial constraints, the researcher limits the focus of this study to Mathematics Instruction since it is one of the course subjects that primarily relies on assessment measures that are inherently residential, such as activities and exercises inside a physical classroom.

Research Methodology

In this study, cross-sectional survey research design was used to gather data at one point in time from a sample of participants to describe and measure their behavior, opinions and views about alternative assessment methods among the secondary school Mathematics learners during COVID-19 pandemic. The research was carried out in Mindanao State University-Sulu, Patikul, Sulu, Philippines. The respondents were the MSU-Sulu college faculty handling Mathematics subject during academic year 2020–2021 and 10% of their students. For

the faculty respondents purposive sampling was applied (selected based on their teaching responsibilities) and for student respondents a stratified random sample to include various colleges. Two cross-validation sets of survey questions were used as the primary research instruments—one for faculty (with items that gauge the assessment strategies they adopted and obstacles they faced) and another for students (with items that indicate their perceived effectiveness with the strategies, as well as their own obstacles). The process of data collection followed a period of approval by the university administration and college deans, where after one month, questionnaires were handed out and collected, either online or in person. Data was collected, tabulated and filed for statistical analysis by using Microsoft Excel, were the data analyzed on SPSS, different analytical tools; arithmetic mean was used in descriptive statistics while t-test and one way ANOVA were pulled in determining differences whereas relationship of variables was envisaged through Correlation analysis.

Table 3.1. Corresponding Statistical Techniques for Each Statement of the Problem

Statement of the Problem	Statistical Technique
1. What are the alternative assessment strategies used by MSU-Sulu college faculty in Mathematics instruction at the time of COVID-19 pandemic? a. Summative assessment b. Formative assessment	Mean
2. What are the challenges met by MSU-Sulu college faculty in employing alternative assessment strategies in Mathematics instruction?	Mean
3. What are the challenges met by MSU-Sulu students during the employment of alternative assessment strategies in Mathematics instruction?	Mean
4. How efficient are the alternative assessment strategies used by MSU-Sulu college faculty in Mathematics instruction as perceived by the students? a. Summative assessment b. Formative assessment	Mean
5. Is there a significant difference between the alternative assessment strategies in Mathematics instruction used by male and female MSU-Sulu college faculty?	t-test
6. Is there a significant difference between the alternative assessment strategies employed in Mathematics instruction when the data are grouped according to their home college/department, educational attainment, and years in teaching?	One-way ANOVA
7. Do the challenges met by MSU-Sulu students affect their perceived efficiency level of the alternative assessment strategies in Mathematics instruction?	Correlation Analysis

Results

The alternative assessment strategies for teaching Mathematics that were employed by Mindanao State University–Sulu faculty, as revealed in the findings of this chapter, could also be viewed as a manifestation of adaptive practices embraced by instructors during COVID-19 crisis-phase instruction (López-Pérez et al., 2020) to navigate the limitations on educational delivery posed by alternative modes of remote and flexible learning. Such assessments included formal exercises, designed not merely to assess learning outcomes but also to keep students engaged and provide continuous feedback in a setting of severely constrained face-to-face interaction. The results also showed signs of a "challenge-efficiency" paradox wherein students experienced greater perceived challenge in terms of the amount to complete to use practice alternative assessments compared to traditional methods however they believed them more effective for impact on learning. But that dichotomy, however, can only be interpreted through informed student resilience and adaptive learning behavior: Harder to learn materials promotes deeper

cognitive engagement and self-regulated learning. Adjustment to instruction as a result of ongoing formative feedback loops has also been advocated for adaptive learners (Adalia et al., 2023) in particular Generation Z students, who are now exposed to multi-faceted, and multi-dimensional iterations of both teaching and curriculum. Additionally, studies exploring how academic performance and academic engagement are perceived in learning contexts suggests that students alter the lenses through which they understand the challenges experienced in an academic context (Adalia et al., 2023). In this context, the introduction of alternative assessment for Mathematics during the pandemic was not merely seen as a substitute for traditional testing but also as a teaching methodology that encouraged persistence, engagement and analytical reasoning in students ultimately showing that appropriate evaluation techniques can still deliver expected outcomes within a difficult education environment.

Summative Assessment Strategies

As indicated on Table 4.1., the frequently used summative assessment strategies were practice problems on modules (m=4.08), quizzes through messenger (Facebook) (m=4.00) and homework–photos sent through messenger (m=3.92). Alternatively, online testing using Google Form and/or Google Classroom (m=2.25) and an oral test over the phone call (m=2.08) were the least used. It shows that MSU-Sulu instructors favored assessment tools and techniques that are convenient and possible amid technological challenges in remote learning.

Table 4.1. Use of Alternative Summative Assessment Strategies

ALTERNATIVE SUMMATIVE ASSESSMENT STRATEGIES	Mean
1. Written report	2.92
2. Reflection paper	2.83
3. Reaction paper	2.75
4. Video presentation	3.42
5. Projects	2.92
6. Portfolios	2.50
7. Practice Problems on Modules	4.08
8. Brief oral recitation	3.00
9. Oral recitation through phone call	2.67
10. Oral Examination through phone call	2.08
11. Quizzes utilizing text messaging	2.67
12. Quizzes utilizing Facebook messenger	4.00
13. Online Examination utilizing Google Form and/or Google Classroom	2.25
14. Online games to test Math Skills	2.42
15. Homework, photos sent through messenger	3.92

Range of Interpretation:
1.00–1.49 – never used; 1.50–2.49 – seldom used; 2.5–3.49 – sometimes used; 3.5–4.49 – often used; 4.5–5.0 – always used

Formative Assessment Strategies

For formative assessments, **Table 4.2.** shows that the faculty often checked if students claimed instructional materials on time (m=4.33), monitored timely submission of requirements (m=4.33), and returned rated works (m=4.25). These findings suggest that MSU-Sulu faculty actively monitored student engagement and progress despite remote learning constraints.

Table 4.2. Use of Alternative Formative Assessment Strategies

FORMATIVE ASSESSMENT STRATEGIES	Mean
1. Checking of attendance on messenger	3.42
2. Returning rated students' works	4.25
3. Checking if students claim instructional materials on time	4.33
4. Monitoring if students submit requirements on time	4.33
5. Allowing students to ask questions on messenger	4.17
6. Contacting students when there are certain issues about performance	4.00
7. Letting students contact the teacher if they have personal concerns that might affect performance	4.17
8. Giving specific feedbacks on what to improve on student's works	3.75
9. Sharing the learning outcomes with students	4.08
10. Letting students rate their works	3.08

Range of Interpretation:
1.00–1.49 – never used; 1.50–2.49 – seldom used; 2.5–3.49 – sometimes used; 3.5–4.49 – often used; 4.5–5.0 – always used

Interpretation: Overall, the faculty often used both summative and formative assessment strategies, with a combined mean of *3.50*, indicating frequent utilization of alternative assessments during the pandemic.

Challenges Met by College Faculty

The faculty faced several challenges when employing alternative assessments. As presented in **Table 4.3.**, the most pressing issues included *assurance that students were the ones doing their activities (m=4.17)*, *internet connectivity (m=4.00)*, and *students' technology literacy (m=4.00)*—all categorized as *highly challenging*. The grand mean (m=3.38) indicates that, overall, the challenges were *moderately challenging* for the faculty.

Table 4.3 Challenges Met by Faculty in the Use of Alternative Assessment Strategies

Challenges	Mean
Accessibility to good internet connection of faculty and students alike	4.00
No training for teachers on alternative assessment before pandemic	3.33
No training for teachers on alternative assessment during pandemic	3.25
Difficulty in aligning the assessment to the learning outcomes	3.00
Time allotment for the assessment task	3.08
Technology literacy and know-how of teachers needed for online assessment	3.00
Technology literacy of students and knowledge in accessing online assessment	4.00
Students' access to digital devices	3.67
Late submission of requirements	3.58
Communicating learning outcomes with students	3.08
Dissemination of information about deadlines	2.92
Giving feedback on performance	2.83
Equity of access due to socio-economic background	3.33
Assurance that students are the ones doing their activities	4.17
Addressing class concerns of students	3.42
Grand Mean	**3.38**

Range of Interpretation:
1.00–1.49 – not challenging at all; 1.50–2.49 – slightly challenging; 2.5–3.49 – moderately challenging; 3.5–4.49 – highly challenging; 4.5–5.00 – very highly challenging

Challenges Met by Students

Students also encountered difficulties in adapting to alternative assessments. As reflected in **Table 4.4.**, the top challenges included *internet accessibility (m=3.83)*, *submission of requirements from remote areas (m=3.78)*, and *communicating class concerns to teachers (m=3.53)*, all categorized as *highly challenging*. The grand mean (m=3.45) shows that students were *moderately challenged* overall.

Table 4.4. Challenges Met by Students During the Employment of Alternative Assessment Strategies

Challenges	Mean
Accessibility to good internet connection	3.83
No training for teachers before pandemic	3.42
No training for teachers during pandemic	3.29
Time allotment for assessment tasks	3.40
Technology literacy of teachers	3.22
Technology literacy of students	3.38
Access to digital devices	3.37
Submission of requirements from far-flung areas	3.78
Dissemination of information about deadlines	3.38
Receiving feedback on performance	3.35
Equity of access due to socio-economic background	3.44
Communicating class concerns to the teacher	3.53
Grand Mean	**3.45**

Interpretation:
Students were moderately challenged, with internet issues and communication barriers being the most significant.

Efficiency of the Alternative Assessment Strategies

The students perceived **summative assessment strategies** as *mostly efficient* (grand mean = 3.37), as indicated in **Table 4.5.**, with *written reports (m=3.94)* and *reflection papers (m=3.79)* ranking highest.

Table 4.5. Efficiency Level of Alternative Summative Assessment Strategies

Alternative Summative Assessment Strategies	Mean
Written report	3.94
Reflection paper	3.79
Reaction paper	3.70
Video presentation	3.40
Projects	3.24
Portfolios	2.85
Practice Problems on Modules	3.60
Brief oral recitation	3.50
Oral recitation through phone call	2.94
Oral Examination through phone call	2.73
Quizzes utilizing text messaging	3.34
Quizzes utilizing Facebook messenger	3.25
Online Examination utilizing Google Form/Classroom	3.63
Online games to test Math Skills	2.93
Homework, photos sent through messenger	3.65
Grand Mean	**3.37**

This Table 4.6. shows that **formative assessment strategies** were perceived as *highly efficient* (grand mean = 3.72), with *sharing learning outcomes (m=4.00)* and *monitoring submission of requirements (m=3.90)* ranking highest.

Table 4.6. Efficiency Level of Alternative Formative Assessment Strategies

Alternative Formative Assessment Strategies	Mean
Check attendance on messenger	3.83
Return rated works	3.59
Check if instructional materials are claimed on time	3.65
Monitor submission of requirements	3.90
Allow students to ask questions on messenger	3.81
Contact students about performance issues	3.67
Allow students to contact teachers regarding personal concerns	3.74
Give specific feedbacks	3.57
Share learning outcomes	4.00
Let students rate their works	3.39
Grand Mean	**3.72**

Interpretation:
Overall, the students rated the alternative assessment strategies as *highly efficient* (m=3.55), particularly formative approaches.

Significance Tests
Gender Differences:

As shown in **Table 4.7.**, there was *no significant difference* (p=0.583) between male and female faculty in their use of alternative assessment strategies.

Table 4.7. The t-test for Alternative Assessment Strategies Used by Male and Female Faculty

Independent Samples Test	t-test for Equality of Means			
	F	t	df	Sig. (2-tailed)
Alternative Assessment Strategies	0.07	-0.57	10	0.583

Home College, Educational Attainment, and Years in Teaching:

The results of the One-Way ANOVA in **Tables 4.8–4.10** indicate *no significant differences* based on these variables (p-values = 0.360, 0.861, and 0.235, respectively).

Table 4.8. One-Way ANOVA According to Home College

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.300	3	.433	1.233	.360
Within Groups	2.813	8	.352		
Total	4.114	11			

Table 4.9. One-Way ANOVA According to Educational Attainment

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.622	4	.156	.312	.861
Within Groups	3.491	7	.499		
Total	4.114	11			

Table 4.10 One-Way ANOVA According to Years in Teaching

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.626	3	.542	1.743	.235
Within Groups	2.487	8	.311		
Total	4.114	11			

Relationship Between Student Challenges and Perceived Efficiency

Finally, **Table 4.11.** reveals a *moderate positive correlation* (r=0.478, p<0.01) between challenges met by students and their perceived efficiency of assessment strategies, indicating that as challenges increased, perceptions of efficiency also tended to rise.

Table 4.11. Relationship Between the Challenges Met by Students and Perceived Efficiency Level

Challenges Met by Students	Perceived Efficiency Level
Pearson Correlation	.478**
Sig. (2-tailed)	.000
N	144

Interpretation:

The positive relationship indicates, when there is a moderate setback in comparison to the prior time of day instruction, learners were still favorable with these alternative assessment strategies and their efficiency was high: that reveals an adjustment attribute from students and resilience on remote instruction.

Discussion

This study "Assessment Strategies and Challenges in Teaching Mathematics of MSU-Sulu in Response to COVID-19 Pandemic" looked into the alternative assessment adopted by faculty, challenges faced by both teachers and students, and the extent of efficiency of these strategies in teaching Mathematics during pandemic. Results showed that MSU-Sulu faculty resorted to delivering alternative summative assessments akin of the pre-pandemic practice, examples are practice problems on modules, quizzes through Facebook Messenger and sending homework via Messenger. Among the less frequent assessment methods were video presentations, projects, written reports and reflection papers (occasionally applied); and online games, Google based assessments and oral examinations (infrequently used) due middle of the 20th century technological limitations. In relation to the formative evaluation process, faculty members widely used practices related to monitoring of students and feedback provision such as checking attendance and submissions, returning itemized work and keeping in touch through online. In general, the faculty were reasonably diligent in trying to monitor student performance despite the restrictive environment of remote learning.

Faculty and students faced a number of issues, including problems related to Internet connection, computer skills disabilities related to use of technology, access to devices and oversight that was being done on their academics by the students themselves. Challenges for faculty were perceived to be very difficult in this area, while among students, inadequate internet connectivity; difficulties in sending requirements from remote localities and limited interaction with the lecturer surfaced as their primary barriers. Despite these challenges, students found most of the alternative assessment methods particularly (those similar to pre-pandemic assessments) very efficient. Written reports, reflective papers, homework exercises and online quizzes were identified as useful instruments to facilitate learning. Yet self- assessment tasks, such as rating their own works, were considered less effective; suggesting that students still appreciated the importance of teacher -led evaluation and feedback in Maths learning. The statistical evidence also indicated there were no significant differences in the types of alternative assessment strategies used,

according to faculty gender, department, level of education, or years in teaching that would account for use of alternate forms of assessments. Further, challenges that students faced were positively related to the perceived efficiency of the assessments suggesting that despite being more challenges respondents recognized and valued the purpose these assessment served in enhancing their learning.

In summary, the research demonstrates that MSU-Sulu faculty succesfully transitioned to assessing students remotely through familiar and accessible means with an emphasis on communication and feedback. Fundamentals for professional psychology education were presented, given the teaching and learning practices during SARS-CoV-2 times when both teachers and students showed resilience and adaptation in technological/logistic obstacles. The results are indicative of the role of teacher-student interaction, institutional support and accessibility to technology for ensuring quality Mathematics teaching/learning in crisis.

Several recommendations were suggested in the light of these findings. Suggested for further studies: (1) formative and summative assessment practices in Mathematics both during and after the pandemic, inclusive at all levels of education in Sulu; and, (2) factors influencing the utilization and effectiveness of alternative assessments. Policy School administrators should consider permitting small face-to-face screenings and consultations under health guidelines to enhance communication and the equity of evaluation. For program innovation, the government and universities need to focus on available resources of internet infrastructure and on-going teacher training and workshop related with alternate way of assessment to improve instructional quality i.e., preparedness for future disruption. Practice finally: Teachers are invited to offer ongoing professional and personal development preparing them for the changing needs of students; Students should foster self-responsibility, motivation and persistence to ensure that learning is maintained in restricted contacting environments.

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