



## "Assessing the Implementation of Outcomes-Based Education in Mathematics Teaching: A Case Study of Bohol Island State University – Calape Campus"

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### ABSTRACT

The study determined the extent of implementation of the Outcomes-Based Education in Mathematics teaching in Bohol Island State University – Calape campus. Methodological triangulation was employed by descriptive means – survey, documentary analysis and focused group discussion. The findings showed that Mathematics teachers of Bohol Island State University – Calape campus practiced or complied to an average extent the competencies for outcomes – based learning program / syllabus design, curriculum implementation or strategies, and assessment. The lack of orientation or training on Outcomes – based Education was one of the major constraints identified on the implementation of outcomes – based Mathematics teaching. The identified areas for development served as basis for the proposed faculty capability building programs for the mathematics teachers of BISU – Calape. It is therefore recommended that the faculties handling the mathematics courses would undergo reorientation session or a series of continuing faculty development sessions on the implementation of outcomes-based education to add-on to the achieved competencies, specifically on syllabus design; instructional alignment, instruction and assessment, and assessment of learning. Similar studies could be conducted for other colleges, other learning areas and/or for the entire university.

**Keywords:** Outcomes – based Education, course syllabus design, curriculum implementation, strategies, assessment

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### INTRODUCTION

Outcomes-based education is a model that focuses on students' learning and performance abilities. It aims to ensure that all students achieve specific, measurable outcomes. William Spady, a leading advocate of outcomes-based education, emphasizes the importance of clear standards and criterion-referenced assessment. Implementing outcomes-based education requires translating desired outcomes into course objectives and aligning teaching methods and assessment accordingly. It involves a shift from teacher-centered to student-centered learning, with teachers serving as facilitators. Assessment tools should reflect observable and measurable competencies.

The implementation of quality-assured higher education through outcomes-based education is crucial for ensuring the quality of teaching and learning. Mathematics, as a universal part of human culture, serves as a tool and language for various sciences and plays a vital role in modern life. With society's increasing dependence on technology, there is a growing demand for individuals with strong mathematical training and analytical skills. A degree in mathematics provides a broad range of problem-solving, logical reasoning, and flexible thinking skills, leading to diverse and promising career prospects.

The rapid pace of technological development necessitates continuous updating and mastery of new techniques and theoretical concepts in various professions. Fluency in mathematics becomes an essential asset for professionals in navigating this changing landscape. The evolving demands of mathematics-based professions, coupled with the need to address inadequate mathematics abilities among students, have resulted in significant changes in mathematics education. Modern techniques and methods, driven by technological advancements, have influenced the teaching of mathematics.

The conceptual framework of the basic and tertiary mathematics curriculum recognizes mathematics as a subject that permeates life at any age and under any circumstances. The twin goals of mathematics education, critical thinking, and problem-solving, are essential for students' development. Critical thinking involves active and skillful conceptualization, analysis, synthesis, and evaluation of information to guide belief and action, while problem-solving focuses on finding solutions to unknown difficulties. Achieving these goals requires an organized curriculum, high-level skills, desirable values and attitudes, and appropriate tools.

In higher education institutions, it is essential to ensure the attainment of expected outcomes and mathematics capabilities and attitudes through robust management systems and assessment tools. These systems and processes contribute to quality outcomes, sustainable programs, and initiatives. External governing bodies and accreditation organizations worldwide increasingly require tertiary institutions to demonstrate self-regulating processes that align with their missions and goals, including outcomes-based education. In the Philippines, higher education institutions are mandated to offer programs aligned with outcomes-based education for quality assurance.

Implementing outcomes-based education will significantly impact the planning and teaching methods of educators. The full implementation of outcomes-based education, aligned with global standards such as the Bologna and Washington accords, is crucial for colleges and universities. Therefore, it is important to determine the extent of curriculum plan implementation for mathematics teaching and how mathematics teachers ensure the attainment of intended outcomes, both for mathematics courses in all programs and

specific program outcomes, to contribute to the successful implementation of outcomes-based curriculum plans at the Bohol Island State University - Calape.

### **OBJECTIVES**

The study aimed to determine the extent of the implementation of Outcomes-Based Education (OBE) in terms of course syllabus design, strategies, and assessment in teaching Mathematics at Bohol Island State University-Calape Campus. The researcher also seeks to identify the challenges and limitations in the implementation of OBE in order to identify development needs and areas of concern. These findings will serve as the basis for the faculty's capability building through continuing orientation and re-orientation for the implementation of Outcomes-Based Education at the University.

### **METHODOLOGY**

This study employed a methodological triangulation approach, utilizing descriptive means such as surveys, documentary analysis, and focused group discussions as research methods to assess the extent of implementation of Outcomes-Based Education (OBE) in Mathematics teaching. The study was conducted at the Bohol Island State University (BISU) – Calape Campus, located in San Isidro, Calape, Bohol. The respondents for this study were the Mathematics teachers at the University.

Phase 1 of the study focused on data collection using survey instruments based on CHED's Handbook on Typology, OBE, and ISA. The survey questionnaire aimed to determine the professional attributes of Mathematics teachers at Bohol Island State University – Calape Campus and assess the extent of implementation of OBE in Mathematics teaching. Specifically, the survey examined practices related to syllabus design, curriculum implementation or strategies, and assessment. An additional instrument was provided to identify constraints in the implementation of outcomes-based Mathematics teaching, specifically regarding course syllabus design, curriculum implementation/strategies, and assessment.

Phase 2 of the study involved the verification of the respondents' responses through documentary analysis. Course syllabi, major exam questionnaires, and performance tasks were gathered and analyzed using checklists and rubrics.

Finally, a focused group interview was conducted using guide questions to validate the data gathered from the survey and to explore the respondents' perceptions of the implementation of Outcomes-Based Mathematics teaching and learning. The interview also provided valuable insights into the challenges and limitations encountered by the respondents during the implementation of OBE.

## RESULTS AND DISCUSSIONS

The following tables present and examines the data collected from the survey and documentary analysis, which aimed to identify the professional characteristics of teachers, as well as the level of implementation and challenges faced in outcomes-based education for Mathematics courses. The analysis of the collected data served as the foundation for proposing faculty capability building programs to enhance the implementation of outcomes-based mathematics education."

### The Extent of Implementation of the Outcomes-Based Education in the Course Syllabus Design

Table 1 shows the respondents' perceived extent of implementation of the OBE in the course plan or course syllabus design of the Mathematics courses at the Bohol Island State University in terms of the teachers' competencies for course syllabus design based on their responses to the survey questions and in the analysis of the nineteen (19) Mathematics courses' syllabi.

**Table 1 Extent of Implementation of the Outcomes-Based Education in the Course Syllabus Design**

Competencies for Course Syllabus Design	Respondents' Mean and Descriptive Rating on Extent of Practice	Syllabi Analysis' Mean Rating on Extent of Compliance and Remarks	
		Rating	Remarks
<p>1. In preparing the syllabus, it begins with asking what competencies (knowledge, skills, and attitudes or KSA) students should have by the end of the course.</p> <ul style="list-style-type: none"><li>• Knowledge refers to information that the students would have stored through the learning experience.</li><li>• Skills refer to demonstrable abilities.</li><li>• Attitudes refer to evaluative cognitions regarding things/activities (positive or negative judgment).</li></ul>	<p><b>4.19</b> Practiced to a Great Extent</p>	<p><b>3</b> Complied to an Average Extent</p>	<p>Course objectives were identified in the 95% or 18 of the 19 syllabi provided for analysis.</p> <p>Not all of the said course objectives provided for valid and appropriate competencies to be attained by the students.</p>

2. The learning outcomes are written using active verbs that are observable/measurable and demonstrate exemplary behavior and standards, or a particular action.	<b>3.80</b> Practiced to a Great Extent	<b>3</b> Complied to an Average Extent	Learning objectives not outcomes were identified in the curriculum plan, generally needing improvement in stating these in behavioral terms.
3. The learning plan could be constructed, that is, lay out the plans for:	<b>3.32</b> Practiced to an Average Extent	<b>3</b> Complied to an Average Extent	100% of the nineteen (19) syllabi provided for analysis showed plans for content delivery with time framework and instructional resources.  However, only 8 or 42% of these syllabi showed plans for teaching – learning activities / methods and outcomes – based assessment.
a) content	3.60		
b) methodology	3.40		
c) resources	3.20		
d) assessment	3.40		
e) budget of class time	3.00		
4. As I prepared/revised the syllabus/syllabi of the course assigned to me, I clearly defined	<b>3.20</b> Practiced to an Average Extent		
a) all course outcomes (general objectives of the subject) and	3.20	<b>1</b> Complied to a Very Little Extent or Not Complied (NC)	Only one of the nineteen or 5% of the syllabi identified course outcomes, the rest defined the courses' objectives
b) intended learning outcomes (specific objectives for a unit of content/performance) which are aligned to program outcomes and Bohol Island State University's vision, mission, and goals.	3.20	<b>2</b> Complied to a Little Extent	Only six or 32% defined the intended learning outcomes, with a few which are not aligned to the course content.  No syllabi showed mapping of intended learning outcomes to the program and institutional programs.
5. The prepared syllabus helps in shifting my paradigm of teaching from teacher-centered to student-centered learning.	<b>3.40</b> Practiced to an Average Extent	<b>3</b> Complied to an Average Extent	Generally, class activities showed teacher – centered teaching.
6. I prepare the syllabus beginning with the writing of learning outcomes instead of course objectives.	<b>2.40</b> Practiced to a Little Extent	<b>1</b> Complied to a Very Little Extent or Not Complied (NC)	Only 1 of the 19 or 5% of the syllabi perused identified course outcomes instead of course objectives.

7. I consider that the learning process involves a system that begins with designing the curriculum so that course outcomes are aligned with program outcomes, and that learning activities and assessment are aligned with the learning outcomes of each course.	<b>3.40</b> Practiced to an Average Extent	<b>1</b> Complied to a Very Little Extent or Not Complied (NC)	Alignment was not evident in all the syllabi, The mapping of the institutional outcomes to the program outcomes, to the course outcomes, and the intended learning outcomes of each course based on OBE Framework was not done in all syllabi.
8. The learning outcomes are used to determine the content and methodology that will help achieve the learning outcomes. The syllabus usually contains the	<b>3.30</b> Practiced to an Average Extent	<b>3</b> Complied to an Average Extent	All of the 19 syllabi identified content outline, requirements, grading system, and learning resources. However, alignment to the learning outcomes was not shown. Only in 6 or 32% of the syllabi identified intended learning outcomes and 8 or 42% identified methodology and assessment formats without alignment to course outcomes.
a) learning outcomes,	3.00		
b) the planned content and methodology that will lead towards the learning outcomes,	3.40		
c) the learning resources to be used,	3.40		
d) the requirements,	3.40		
e) the grading system, and	3.60		
f) relevant policies for the class.	3.00		
9. I also consider that learning outcomes should be written in terms of desired outcomes, and use active verbs that can be observed/measured in terms of behavior.	<b>2.80</b> Practiced to an Average Extent	<b>2</b> Complied to a Little Extent	The learning outcomes were identified only in 6 out of the 19 syllabi. These though showed the need for improvement specifically on how these were stated.
10. <i>The course description shall provide the content and learning competencies to be achieved to the course. I clarify the scope, purpose and relevance of the topic and introduce the course format and organization.</i>	<b>2.50</b> Practiced to a Little Extent	<b>3</b> Complied to an Average Extent	100% of the syllabi provided for the course descriptions from the CMOs. However, those did not provide for the identified learning competencies, format and organization of topics.
11. <i>I make sure the syllabus is visually appealing, making it easy for students to skim the syllabus and find key information.</i>	<b>3.40</b> Practiced to an Average Extent	<b>3</b> Complied to an Average Extent	A little revision to show the alignment of the outcomes and other relevant details may be helpful.
12. I make sure that the sum or combination of learning outcomes in the various courses I am handling are truly aligned with the program outcomes.	<b>3.40</b> Practiced to an Average Extent		
<b>Grand Mean</b>	<b>3.25</b>		

	Practiced to an Average Extent	
Legend: 4.21 – 5.00 – Practiced/Complied to the Greatest Extent 3.41 – 4.20 – Practiced/Complied to a Great Extent 2.61 – 3.40 – Practiced/Complied to an Average Extent 1.81 – 2.60 – Practiced/Complied to a Little Extent 1.00 – 1.80 – Practiced/Complied to a Very Little Extent or not Complied		

Mostly of the competencies on designing the course syllabus were rated by the respondents with a grand mean rating of **3.25**, or the respondents considered themselves to have practiced the said competencies to an **average extent** or the respondents believe that they have an average proficiency / competence in designing the courses' syllabi. However, the respondents rated themselves to have practiced to a little extent in some of the competencies like writing of learning outcomes instead of course objectives at the beginning in preparing the syllabus and clarifying the scope, purpose and relevance of the topic and introduce the course format and organization as these were rated with 2.40 and 2.50 respectively.

From the findings, it could be inferred that the teachers need an orientation or re-orientation sessions on learning program or syllabi designing with focus on the course outcomes and the provision for instructional alignment based on the OBE framework.

### **The Extent of Implementation of Outcomes-Based Education on the Strategies and Competencies for Curriculum Implementation**

Table 2 in the next page shows the competencies for curriculum implementation/strategies as to what extent the teachers handling Mathematics classes had used these methods in their classes.

The Mathematics teachers of Bohol Island State University (BISU) – Calape Campus perceived that they practiced to a little extent in some of the identified competencies for curriculum implementation or methods such as explaining to the students the intended learning outcomes, content coverage, and detailed the requirements of the course alongside with the time frame and considering the learning plan as an essential tool to oversee the match between the learning outcomes and the content and methodology as these were rated with 2.60. However, in general, the respondents perceived that they utilized or **practiced to an average extent** mostly of the identified competencies for curriculum implementation or methods as these were rated with a grand mean rating of **3.15**.

This is indicative of their need for continuing teacher competencies development aligned to OBE, through advanced studies, training / workshops and self-improvement techniques.

**Table 2**  
**The Extent of Implementation of Outcomes-Based Education on the Strategies and Competencies for Curriculum Implementation**

Competencies for Curriculum Implementation / Methods/Strategies	Mean Rating on Extent of Practice / Applicability	Descriptive Rating
1. As a teacher who is a facilitator of learning, I allow my students to play their part in constructing knowledge through	<b>3.06</b>	Practiced to an Average Extent
a) experience,	3.40	
b) discussions,	3.20	
c) reflections, and	2.60	
d) other processes (state if any, then rate)		
2. As learning outcomes focus on the student, consequently these are changes in the choice of methodology used. New approaches need to be implemented, particularly those that focus on the competencies that the student has to develop.	<b>2.80</b>	Practiced to an Average Extent
3. I have ensured that my students have fully understood the outcomes they need to achieve, the tasks that they need to do and the assessment conditions.	<b>3.20</b>	Practiced to the Greatest Extent
4. I also explained to the students the intended learning outcomes, content coverage, and detailed the requirements of the course alongside with the time frame.	<b>2.60</b>	Practiced to a Little Extent
5. I consider that some methodologies take more time than others to implement. The learning plan can have different styles but it is essentially a tool to oversee the match between the learning outcomes and the content and methodology.	<b>2.60</b>	Practiced to a Little Extent
6. As a teacher, I need to see the students in action, to diagnose where the students need improvement, and to make the necessary interventions to address these points of weakness.	<b>3.00</b>	Practiced to an Average Extent
7. I have identified the teaching and learning activities that could facilitate the achievement of the intended learning outcomes.	<b>3.40</b>	Practiced to an Average Extent
8. As I believe that all my students have the capability to learn, and their learning time varies from one to the other, I also need to give them opportunities to finally achieve the intended learning outcomes with my continuous effort, as a way of support.	<b>3.40</b>	Practiced to an Average Extent
9. As a teacher, I coach and facilitate student learning and overall comprehension of material.	<b>3.20</b>	Practiced to an Average Extent
10. I guarantee that students are instructed at the ideal level, striking a balance between challenging them and ensuring enough achievements to boost their confidence and motivation for learning.	<b>3.20</b>	Practiced to an Average Extent
11. I make sure that students who are mastering new academic skills have frequent opportunities to try these skills out with immediate corrective feedback and encouragement.	<b>3.20</b>	Practiced to an Average Extent
12. As students become more proficient in their new skills and can work independently, I give them lots of opportunities to drill and practice to strengthen the skills.	<b>3.80</b>	Practiced to a Great Extent



13. Whenever possible, I make students practice their sessions interesting by using game-like activities; coming up with real-world, applied assignments; or incorporating themes or topics that the student finds interesting.	<b>3.40</b>	Practiced to an Average Extent
14. I assure for the attainment of the learning outcomes which is not an end in itself but it provides building blocks for achieving higher-level outcomes, such as applying learning, analyzing ideas, evaluating options, or creating new solution methods.	<b>3.20</b>	Practiced to an Average Extent
<b>Grand Mean</b>	<b>3.15</b>	Practiced to an Average Extent
Legend: 4.21 – 5.00 – Practiced/Applicable to the Greatest Extent 3.41 – 4.20 – Practiced/Applicable to a Great Extent 2.61 – 3.40 – Practiced/Applicable to an Average Extent 1.81 – 2.60 – Practiced/Applicable to a Little Extent 1.00 – 1.80 – Practiced/Applicable to a Very Little Extent or not Practiced		

### **The Extent of Implementation of the Outcomes-Based Education on Assessment**

Assessment in OBE should be guided with the OBE principles: on the **clarity of focus** or on what teachers want students to learn, **designing backwards** or clearly defining the learning outcomes, **high expectations** or challenging standards of performance to encourage students to learn better, and **expanded opportunities** or all students are expected to excel, thus equal opportunities should be provided.

Assessment procedures in OBE should be valid, reliable, fair, reflect knowledge and skills that are important to students, provide details on the students' progress in learning, support every student's opportunity to learn what are important, allow individuality or uniqueness and should be comprehensive to cover a wide range of learning outcomes.

Table 3 presents the competencies for assessment that the Mathematics teachers utilized to measure the extent of attainment of the intended outcomes and to make sure these are in line with the principles of Outcomes-Based Education through the respondents' perceived levels of practice and the analysis of mathematics assessment tools.

**Table 3 The Extent of Implementation of the Outcomes-Based Education on Assessment**

Competencies for Course Syllabus Design	Respondents' Mean and Descriptive Rating on Extent of Practice	Assessment Tools Analysis' Mean Rating on Extent of Compliance and Remarks	
		Rating	Remarks
1. The assessment tools which I use in my classes have to reflect the attainment of desired competencies, which are stated in terms of something observable and/or measurable.	<b>3.00</b> Practiced to an Average Extent	<b>3</b> Complied to an Average Extent	The written test showed to have lower levels of content and face validity.
2. I have also identified the assessment tasks (ATs) or the outcomes-based assessments (OBAs) that can be used to measure whether the students have achieved the intended learning outcomes.	<b>2.80</b> Practiced to an Average Extent	<b>3</b> Complied to an Average Extent	Assessment tasks / designs were not detailed except for the Table of Specifications which covered content on strategies only. The TOS did not show the mapping of items to the intended learning outcomes.
3. I utilize assessment formats which reflect the learning outcomes, these are, the assessment formats which should be aligned with learning outcomes and not the other way around.	<b>2.80</b> Practiced to an Average Extent	<b>3</b> Complied to an Average Extent	Considering that learning outcomes were generally not identified, the content not the outcomes served as basis in the conduct of assessment.
4. I gather assessment data which inform us of what, how, how much, and how well the students are learning what I am teaching, based on mutually agreed explicit criteria.	<b>2.60</b> Practiced to a Little Extent	<b>3</b> Complied to an Average Extent	Assessment formats generally show and are limited to what have been taught by the teachers.
5. In developing alternative modes of evaluation and assessment, I utilize rubrics which are clear so that the process maintains a certain objectivity and transparency.	<b>3.20</b> Practiced to an Average Extent	<b>3</b> Complied to an Average Extent	A few rubrics were available but the task designs were not provided.
<b>Grand Mean</b>	<b>2.88</b> Practiced to an Average Extent		
Legend: 4.21 – 5.00 – Practiced/Complied to the Greatest Extent 3.41 – 4.20 – Practiced/Complied to a Great Extent 2.61 – 3.40 – Practiced/Complied to an Average Extent 1.81 – 2.60 – Practiced/Complied to a Little Extent 1.00 – 1.80 – Practiced/Complied to a Very Little Extent or not Complied			

The findings also showed that the teacher respondents considered themselves to have practiced the identified competencies for the conduct of assessment to **an average extent**. They rated themselves with a grand mean rating of **2.88** in most of the competencies. However the respondents seemed to practiced to a little extent in gathering assessment data which informed them of what, how, how much, and how well the students were learning of what the teacher was teaching, based on mutually agreed explicit criteria as it was rated with 2.60.

The findings determined through the survey and the analysis of the syllabi and assessment tools devised by respondents showed their lack of proficiency / competence in the implementation of outcomes – based Mathematics education.

To further validate the findings, the conduct of group interview or focused group discussion was done.

Table 4 details the respondents' answers to the given questions.

**Table 4 Focused Group Discussion**

Questions	Mathematics Teacher's Responses
1) How do you prepare the outcomes – based learning programs / syllabi for the Mathematics courses that you are assigned to teach?	<ul style="list-style-type: none"><li>• All of the syllabi are revised or modified versions of the old or previous years' syllabi as 4 or 80% of the Mathematics teachers are new or in their first year in Bohol Island State University – Calape Campus.</li><li>• The teachers have not yet attended trainings / seminars on outcomes – based education and orientation sessions for outcomes – based syllabus preparation. Thus, all teachers prepare these based on their own concepts on learning programs / plans, and that the course outcomes, program outcomes and institutional outcomes should be aligned.</li></ul>

<p>2) How are the mathematics lesson taught to assure the attainment of the desired learning outcomes?</p>	<p>(T1) Students are assigned to present report / reporting and are required to do researches.</p> <p>(T2) In the Problem Solving class, students are required to do researches on strategies, and play the role of being problem posers.</p> <p>(T3) Students are engaged in group activities to work on problem solving tasks.</p> <p>(T4) Through lectures, the teacher gave examples and provide for drills and exercises for skills development.</p> <p>(T5) Through lecture – discussions lessons are done, learning is continuously assessed through board works and quizzes.</p> <ul style="list-style-type: none"> <li>● The course content of the syllabi are discussed in the orientation session, the students are encouraged to have a copy of the content outline so they could prepare for their lessons.</li> <li>● Games, fun-activities and students’ presentations of real-life problems are also provided to assure that the learners are engaged in their lessons.</li> <li>● Diagnostic tests on prerequisites for each lesson are not provided as they consider this to be time – consuming, and the teachers consider themselves preoccupied with the preparation for non-Mathematics teaching load, and the many school activities they are assigned to handle. T1 though consider to give short check – up tests.</li> </ul>
<p>3) In what ways do you monitor your students’ performance or the attainment of the intended learning outcomes?</p>	<ul style="list-style-type: none"> <li>● Generally, the written formative and summative assessment formats are utilized to determine their mathematics performance levels.</li> <li>● Written tests include questions which develop the students’ higher order thinking skills.</li> <li>● Alternative modes of assessment are also used. Projects, reports, portfolios and problem solving demonstrations are rated with the use of rubrics which are presented to the class before assessment is done</li> </ul>

4) Do you have any area of concern or problem encountered in the conduct of outcomes – based Mathematics teaching?	<ul style="list-style-type: none"><li>• The teachers are not provided with the orientation and re-orientation sessions on outcomes – based planning and teaching Mathematics lessons.</li><li>• Due to a significant number of school activities and emergency meetings, not all required content to be taught are covered.</li></ul>
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From Table 4, it could be gleaned that the respondents as new teachers lacked the capabilities to perform the expected outcomes – based teaching practices. Thus, their need for the continuing teacher development programs specifically or outcomes – based mathematics education.

## Identified Constraints in the Implementation of the Outcomes-Based

### Education in Mathematics Classes

From the findings of this study, it could be gleaned that the Bohol Island State University – Calape Campus Mathematics teachers perceived themselves to have achieved and practiced the identified teaching competencies needed in the implementation of the outcomes-based education to **an average extent**.

However, the teachers have also rated some attributes or teaching competencies on the extent of implementation of outcomes-based education on syllabus design, in curriculum implementation/strategies/methods and assessment with low ratings, which is indicative of the lower levels of the extent of practice.

Table 5 presents the identified constraints in the implementation of the outcomes-based education in the Mathematics classes at Bohol Island State University – Calape Campus.

**Table 5 Identified Constraints in the Implementation of the Outcomes-Based Education in Classes**

<b>Teacher Competencies in Outcomes-Based Education Implementation with Lower Levels in the Extent of Practice / Applicability</b>	<b>Constraints</b>	<b>Number of Respondents who Identified the Constraint</b>
<b>A. Course Syllabus Design</b>  1. I prepare the syllabus beginning with the writing of learning outcomes instead of course objectives	<ul style="list-style-type: none"><li>● Not my orientation to start the syllabus with the learning outcomes</li></ul>	<b>2</b>
	<ul style="list-style-type: none"><li>● Difficulty in shifting from the old paradigm in preparing the syllabus</li></ul>	<b>1</b>
<b>B. Curriculum Implementation / Methods</b>	<ul style="list-style-type: none"><li>● Time management</li></ul>	<b>4</b>

2. I have ensured that my students have fully understood the outcomes they need to achieve, the tasks that they need to do and the assessment conditions.	<ul style="list-style-type: none"> <li>● Lack of resources to provide copies of the syllabi</li> </ul>	<b>3</b>
	<ul style="list-style-type: none"> <li>● Due to a number of school activities, only few topics are delivered</li> </ul>	<b>1</b>
3. As students become more proficient in their skills and can work independently, I give them lots of opportunities to drill and practice to strengthen the skills.	<ul style="list-style-type: none"> <li>● Large classes</li> </ul>	<b>2</b>
	<ul style="list-style-type: none"> <li>● Overloaded with the teaching loads thus, giving such activities will give additional paper works to be checked</li> </ul>	<b>2</b>
	<ul style="list-style-type: none"> <li>● Time management</li> </ul>	<b>3</b>
4. Whenever possible I make students practice their sessions interesting by using game-like activities; coming up with real world, applied assignments; or incorporating themes or topics that the students finds interesting.	<ul style="list-style-type: none"> <li>● consumes much time especially in large classes</li> </ul>	<b>2</b>
	<ul style="list-style-type: none"> <li>● Limited space for group activities</li> </ul>	<b>1</b>
	<ul style="list-style-type: none"> <li>● Limited sources for drills and exercises</li> </ul>	<b>3</b>
5. I assure for the attainment of the learning outcomes which is not an end in itself but it provides building blocks for achieving higher-level outcomes, such as applying learning, analyzing ideas, evaluating options, or creating new solution methods	<ul style="list-style-type: none"> <li>● Large classes delimits activities to specific learning outcomes</li> </ul>	<b>1</b>
	<ul style="list-style-type: none"> <li>● Lack of grasp of specific learning outcomes on higher level outcomes</li> </ul>	<b>1</b>
	<ul style="list-style-type: none"> <li>● Lack of resources to provide opportunities to fully achieve the higher level outcomes</li> </ul>	<b>3</b>
<b>C. Assessment</b>	<ul style="list-style-type: none"> <li>● Difficulty in shifting from old paradigms in giving assessment</li> </ul>	<b>2</b>
6. I have also identified the assessment tasks (ATs) or the outcomes-based assessment	<ul style="list-style-type: none"> <li>● Time management in evaluating the nature of outcomes-based assessment</li> </ul>	<b>2</b>

(OBAs) that can be used to measure whether the students have achieved the intended learning outcomes (ILOs).	<ul style="list-style-type: none"><li>• Due to a number of activities in school, I've find hard to cover the topics to be delivered and it affects the topics to be assessed.</li></ul>	<b>1</b>
7. I gather assessment data which inform us of what, how, how much, and how well the students are learning what I am teaching, based on mutually agreed explicit criteria.	<ul style="list-style-type: none"><li>• Lack of time to analyze and diagnose the results of students' performance</li></ul>	<b>2</b>
	<ul style="list-style-type: none"><li>• Lack of statistical skills to analyze the data</li></ul>	<b>1</b>

Table 5 shows the constraints on the implementation of Outcomes-Based Education on the course syllabus design, curriculum implementation/methods, and assessment. On course syllabus design, 60% of the respondents have identified to lack the competence in preparing the outcomes – based syllabus design. In the curriculum implementation/methods, the highest identified constraint was time management. This meant that teachers handling the course were given teaching overloads. It is assumed that having a prepared syllabus for an assigned course is preferable. In the conduct of assessment, lack of time to analyze and to interpret the results of students' performance were also considered as constraints. The teachers identified the lack of time or time management, lack of instructional resources, large classes, difficulty in shifting paradigms, and lack of statistical skills to analyze data as deterrents in the implementation of the outcomes – based Mathematics education.

In terms of curriculum implementation/methods, four of the respondents have answered that time management was one of the reasons why they had not ensured the students to fully understand the outcomes they need to achieve and the assessment conditions. Large classes, time management, and time consuming activities were identified as the constraints on the OBE curriculum implementation. Considering that the number of students per class is quite large, the teachers could not provide for skills development and assessment in one session.

The teachers considered the lack of time to diagnose student difficulties and interpret individual student performance and the teachers' difficulty in shifting from old paradigm in the conduct of assessment are viewed by the teachers as the constraints with higher levels of need for development on assessment in the implementation of outcomes based education.



Based on the foregoing, the aforementioned constraints could be a challenge to overcome if outcomes-based mathematics teaching and learning is to be implemented successfully.

### CONCLUSION

Based on the findings of this study, it can be concluded that the Mathematics teachers at Bohol Island State University - Calape Campus perceive themselves to have achieved the necessary competencies for implementing outcomes-based education to a moderate extent. They have also implemented these competencies in areas such as course syllabus design, curriculum implementation strategies, and assessment, also to a moderate extent or average proficiency.

The study identified several significant constraints in the implementation of outcomes-based education in Mathematics teaching, including syllabus preparation, time management, time-consuming nature of the process, handling large class sizes, limited time for analyzing and diagnosing student performance results, and the difficulty in transitioning from traditional assessment methods.

To effectively implement outcomes-based education in the teaching of Mathematics, it is recommended to review and revise the syllabi for Mathematics courses. Additionally, it is suggested to consider immediate implementation of faculty capability building programs focusing on outcomes-based education implementation, curriculum revisions, and development of teaching skills.

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