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Current Status of Awareness Regarding Assessment in Mathematics Teaching for Capacity Development of Primary School Students: A Study at Selected Primary Schools in Binh Duong Province

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ABSTRACT: This study aims to examine the current level of awareness among primary school teachers regarding assessment in Mathematics teaching, with a focus on fostering students' capacity development, at selected primary schools in Binh Duong Province, Vietnam. The study employed a survey method coupled with quantitative analysis. Data were gathered through a questionnaire distributed to Mathematics teachers at selected primary schools in Binh Duong Province, Vietnam. The article presents the research findings, revealing that the majority of teachers recognize and understand mathematical competence, are able to differentiate between competence and skills in Mathematics teaching, and can identify manifestations of mathematical competence. However, they still face challenges in determining and assessing students' mathematical competence levels, which hampers their ability to effectively monitor the development of students' mathematical skills. This serves as a foundation for proposing measures to enhance assessment capabilities, with the aim of improving the effectiveness of assessment practices for primary school teachers in Mathematics teaching, particularly in the context of capacity development.

KEYWORDS: assessment, Mathematics teaching, primary school teachers.

1. INTRODUCTION

In the context of educational reform, teaching and learning aimed at capacity development has become a central focus in response to the demands of the 2018 General Education Program. Rather than merely emphasizing the transmission of knowledge, the 2018 General Education Program highlights the development of essential qualities and competencies, enabling students to apply knowledge in real-world contexts. Assessment plays a crucial role in this process. Innovations in teaching activities must be accompanied by corresponding innovations in assessment practices. A key innovation in the 2018 General Education Program in Vietnam is the shift from assessing standard knowledge and skills to evaluating students' abilities based on specific manifestations. This approach emphasizes not only the outcomes but also the process through which students engage in learning tasks, focusing on assessing their progress and development.

Primary school teachers play a pivotal role in the implementation of competency-based teaching. Their understanding of assessment significantly impacts the effectiveness of teaching across subjects, particularly in Mathematics. A clear and accurate awareness of assessment enables teachers to evaluate students' mathematical abilities with precision, allowing them to adjust teaching strategies accordingly. This, in turn, facilitates the application of appropriate instructional methods, fosters a positive learning environment, and encourages students to actively engage with the material, fostering creativity and independent exploration.

Given this context, the study aims to explore primary school teachers' understanding of assessment in Mathematics teaching with a focus on capacity development. The findings will provide a foundation for proposing strategies to enhance teachers' awareness and support them in effectively implementing assessment practices that align with capacity-building objectives in Mathematics education.

2. CONTENT

2.1. Assessment in teaching Mathematics towards capacity development

2.1.1. Some related concepts

2.1.1.1. Concept of Assessment in Education

"Assessment is the process of gathering information, forming evaluations and judgments about outcomes based on established goals

and standards, with the aim of making informed decisions to improve the current situation and enhance the quality and efficiency of work." [1].

In education, assessment plays a crucial role in determining the effectiveness of teaching and learning activities. It serves as a foundation for adjusting instructional strategies, curricula, and educational policies. As a result, many educators have conducted research on assessment in education. Below are some key concepts of educational assessment.

Nitko (1996) defined: "Assessment in education as a broad process of collecting information to make informed decisions about students, programs, schools, and educational policies" [2].

"Assessment in education is a systematic process of collecting, synthesizing, and interpreting information about the subject of evaluation (whether it concerns the knowledge or abilities of students, programs, schools, etc.). The goal is to gain a comprehensive understanding and use this information to make informed decisions regarding students, programs, schools, or to shape educational policies." [1].

Author Tran Vui also defined: "Assessment in education as the process of systematically and promptly collecting and analyzing information about the current status, capabilities, or underlying factors affecting the quality and effectiveness of education, in alignment with educational goals. This process serves as the foundation for developing subsequent policies, measures, and actions aimed at enhancing outcomes and addressing shortcomings" [3].

In the training materials on testing and evaluating primary school students for the development of qualities and capacities (Ministry of Education and Training, 2020), it is stated: "Assessing primary school students is the process of systematically collecting and processing information through activities such as observation, monitoring, interaction, assessment, and feedback on students' learning and development. Additionally, assessment includes advising, guiding, motivating students, and interpreting both qualitative and quantitative data regarding learning outcomes, as well as the formation and development of certain qualities and capacities in primary school students" [4].

The above concepts collectively affirm that: "Assessment in education is the process of gathering information about various subjects such as students, programs, schools, etc., to form judgments, make decisions, and develop policies aimed at improving the quality of education". In these definitions, Tran Vui's concept highlights the foundational role of educational goals in the assessment process. This provides a clearer framework for evaluators to make informed and relevant judgments. Furthermore, the concept of student evaluation is more specific, detailing how information is collected from students and how assessment results can be used to positively influence learners. This definition can be seen as a more focused, narrow approach to assessment compared to the broader concepts presented above.

Thus, assessment in education can be defined as "the process through which teachers gather and analyze information by engaging in activities such as observing, monitoring, interacting, assessing, and providing feedback on students' learning and development. This allows teachers to interpret both qualitative and quantitative data regarding students' learning outcomes, as well as the development of certain qualities and abilities. Additionally, assessment enables teachers to motivate, advise, and support students in adjusting and enhancing their learning processes".

2.1.1.2. Concept of Assessment in Competency-Based Teaching

Gordon (1980) and other educators aligned with constructivist theory argue that "learning is a process in which students actively construct new concepts and ideas based on their current and past experiences through engagement and action. As a result, each individual's capacity is developed and refined" [5]. According to Ta Trung Tien (2020), "Competency-based teaching involves organizing learning activities in a coherent sequence, enabling learners to actively explore, discover, and experience, thereby creating knowledge, skills, motivation, attitudes, interests, and beliefs, all under the guidance of teachers in an interactive, dynamic learning environment" [6].

"Assessment in competency-based teaching is an evaluative activity conducted by teachers throughout the instructional process, documenting students' responses as they explore, experience, construct knowledge, or apply it in practical contexts. This form of assessment emphasizes knowledge and skills that can be utilized in real-world situations, thereby aligning education with practical requirements" (Butova, T. G., Danilina, E. P., Beloborodova, Y. S., & Beloborodov, A. A., 2015) [7]. Assessment in competency-based teaching ensures that each learner will master and demonstrate specific competencies by the end of the learning process (Guskey, 2005; Spady, 1994) [8], [9]. Furthermore, assessment in competency-based learning prioritizes observable and easily measurable behaviors (Griffith and Lim, 2014; Guskey, 2005) [10], [8].

Thus, assessment in competency-based teaching focuses on documenting students' behavioral indicators during learning activities to gauge the extent of their capacity development. It provides feedback on students' progress in relation to the program's requirements. This form of assessment emphasizes supporting students' learning, treating assessment activities as an integral part of the learning process, and offering supplementary evidence for evaluating learning outcomes. Assessment in competency-based teaching is conceptualized as evaluating students' learning processes by requiring them to apply knowledge and skills to solve real-world problems. Through this approach, teachers provide timely feedback to guide students' learning, adjust instructional strategies, and encourage self-assessment and peer assessment to enhance the learning experience.

2.1.2. Role of Assessment in Competency-Based Teaching

Competency-based assessment focuses on fostering students' potential abilities rather than solely emphasizing learning outcomes (Levine & Patrick, 2019; Mosalanejad et al., 2013) [11], [12]. This approach serves several key roles:

- Enable teachers to evaluate students' learning process based on observable behaviors, and provide essential feedback that allows students to adjust their learning strategies;
- Assist teachers in monitoring students' progress, enabling them to adapt teaching methods and activities to better meet students' needs;
- Support students in developing the ability to apply knowledge and skills in real-world situations;
- Encourage students to engage in self-assessment and make adjustments to their learning activities for improved outcomes.

Thus, assessment in competency-based teaching for primary school students plays a crucial role in enhancing learning outcomes, aligning with the objectives of the Vietnamese General Education Program.

2.2. Research Methods, Timeline, and Research Tools

2.2.1. Research methods and tools

2.2.1.1. Questionnaire survey method

To address the research questions, a questionnaire was employed to gather data. The questions were designed to explore teachers' perceptions of authentic assessment in Mathematics instruction, specifically in relation to developing competencies for primary school students.

2.2.1.2. Statistical Methods and Data Analysis for Survey Results

Once collected, the data was processed and analyzed to provide essential information for evaluation, enabling an assessment of teachers' awareness regarding the implementation of assessment tasks in Mathematics instruction aimed at developing competencies in primary school students.

Excel software was used as the primary tool for data analysis.

2.2.2. Research timeline

Survey implementation period: from September 2024 to February 2025.

2.3. Research content

- The survey participants consist of teachers currently teaching at public primary schools in Binh Duong, Vietnam, with 92% of them being female.
- To ensure the reliability of the survey sample for assessing the current state of assessment practices and the implementation of authentic assessment in Mathematics instruction aimed at developing competencies, we selected teachers representing various districts, towns, and cities within the province, with diverse professional qualifications and teaching experience. Details are as follows:

+ A total of 481 teachers were surveyed, with the following distribution of educational qualifications: Associate Degree in Education (38%), Bachelor's Degree in Education (61.4%), and Master's Degree (0.6%).
+ Experience: The surveyed teachers have at least one year of experience teaching Mathematics in primary schools, with the maximum experience being 36 years.
+ Survey coverage: The survey was conducted across 9 districts, towns, and cities in Binh Duong Province, which were divided into three regions:
+ Region 1: Phu Giao, Bau Bang, Dau Tieng, and Bac Tan Uyen Districts;
+ Region 2: Ben Cat and Tan Uyen Towns;
+ Region 3: Thu Dau Mot City, Di An, and Thuan An.

Teachers participated in a 10-question survey, covering the following specific content:

- Sources of primary school teachers' understanding of assessment in teaching aimed at developing students' competencies.
- Teachers' ability to classify students' cognitive levels during Mathematics instruction according to Bloom's Taxonomy and as outlined in Circular No. 27/BGDDT from the Ministry of Education and Training of Vietnam.
- Teachers' ability to identify the component competencies of mathematical competence based on students' performance.
- Teachers' ability to differentiate between various indicators of competence and skills.
- Teachers' ability to distinguish between criteria and indicators used for evaluating primary school students.

2.3. Analysis results

*** Sources of primary school teachers' understanding of assessment in teaching aimed at developing students' competencies.**

Table 1. Sources of understanding of Assessment in Mathematics Teaching for Developing Primary School Students' Competencies

Teachers' understanding of assessment in Mathematics teaching aimed at developing primary school students' competencies	**Known**			**Unknown**
	Through training programs	Through self-study of materials and media	Through discussion with colleagues	
Number (of teachers)	349	152	89	31
%	72.6	31.6	18.4	6.3

The data presented in the table above indicates a high level of awareness among teachers regarding competency-based assessment. Specifically, 72.6% of teachers have received formal training in competency assessment, 31.6% are familiar with it through studying materials and media, and 28.4% have gained knowledge through discussions with colleagues. Only a small percentage (6.3%) of teachers have neither been trained nor have knowledge of assessment practices aimed at competency development. Interviews with teachers reveal that the majority have participated in various training sessions organized by the Ministry of Education and Training, as well as local education departments. Only a few teachers did not attend due to certain objective factors. This widespread training represents a key advantage in implementing assessment practices that align with the 2018 General Education Program's focus on competency development.

*** Teachers' ability to classify students' cognitive levels during Mathematics instruction according to Bloom's Taxonomy and as outlined in Circular No. 27/BGDDT from the Ministry of Education and Training of Vietnam (Question 2, Question 9).**

Table 2. Teachers' Ability to Classify Students' Cognitive Levels in Mathematics Instruction according to Bloom's Taxonomy (Question 2)

Student performance in learning Mathematics	**Number of teachers who selected correctly**	
	Number	**%**
a) Write measurements of quantities in decimal form.	132	27.44
b) Draw trapezoids, parallelograms, and rhombuses (using a square grid)	116	24.11
c) Count, read, and write numbers within 10.	162	33.68
d) Describe data in pictorial form.	51	10.53
e) Convert and calculate with volume measurements (cm^3; dm^3; m^3) and time measurements.	152	31.6
f) Recognize squares, circles, triangles, and rectangles through the use of personal learning tools or real objects.	116	24.12

The table above indicates that the percentage of teachers who correctly identified the behavioral manifestations in Mathematics corresponding to the cognitive levels in Bloom's Taxonomy reached a maximum of 33.68%. This data suggests that teachers face certain challenges and limitations in classifying cognitive levels (such as Knowledge, Understanding, and Application) based on students' behaviors during Mathematics instruction. As a result, teachers may encounter difficulties when selecting and designing assessments that align with the required cognitive levels, as well as in accurately evaluating students' cognitive abilities.

Table 3. Teachers' Ability to Classify Students' Cognitive Levels in Mathematics Instruction according to Circular No. 27/BGDDT (Question 9)

Demonstration of Students' Abilities in Mathematics Learning	**Teachers correctly classify the cognitive level of primary school students**	
	Number (people)	**Rate (%)**
a) Grade 1: Arrange numbers correctly in order up to 100 (in groups of no more than four numbers).	162	33.68
b) Grade 1: Calculate the value of a numerical expression involving up to two operations and no parentheses.	106	22.04
c) Grade 2: Identify the practical applications of operations (addition, subtraction, multiplication, division) through visual aids, drawings, or real-life situations.	187	38.88
d) Grade 1: Accurately identify squares, circles, triangles, and rectangles using personal learning tools or real objects.	273	56.76
e) Grade 3: Draw trapezoids, parallelograms, and rhombuses using a square grid.	268	55.72

f) Grade 4: Describe the characteristics of the vertices and sides of parallelograms and rhombuses.	81	16.84

The data in the table above reveals that the percentage of teachers who correctly align students' performance in Mathematics with the three cognitive levels outlined in Circular No. 27/BGDDT on primary school student assessment ranges from 16.84% to 56.84%. This indicates that teachers are not yet fully proficient in classifying cognitive levels based on students' performance.

Furthermore, the data from the teacher survey (Questions 2 and 8) highlights that teachers continue to face significant challenges in classifying cognitive levels based on students' performance during Mathematics instruction.

*** Ability to identify the component competencies of mathematical competence based on students' performance (Questions 3, 4, 5, 6, 7)**

Table 4. Teachers' Ability to Identify Behavioral Manifestations Corresponding to Each Type of Mathematical Competence

Mathematical Competence	True		False	
	Number	Rate (%)	Number	Rate (%)
Ability to use mathematical tools and means	363	75.47	118	24.53
Mathematical communication ability	322	66.94	159	33.06
Mathematical thinking and reasoning ability	302	62.79	179	37.21
Mathematical problem-solving ability	245	50.94	236	49.06
Mathematical modeling ability	242	50.31	239	49.69

The percentage of teachers who correctly identified the manifestations corresponding to each type of mathematical competence was generally at an average level or higher (> 51%). Among these, the highest percentage of teachers correctly identified the ability to use mathematical tools, while the lowest percentage correctly identified the ability to model mathematics. Overall, more than half of the teachers were able to recognize the manifestations of the component competencies of mathematical competence. This indicates that teachers are equipped to develop assessment content that aligns with the assessment objectives and can identify the manifestations of each type of mathematical competence when observing and evaluating primary school students.

*** Ability to Differentiate Between Various Indicators of Competence and Skills (Question 8)**

Table 5. Teachers' Ability to Differentiate between Indicators of Competence and Skills

Indicator content	True		False	
	Number	%	Number	%
a) Grade 1-2: Correctly demonstrate the steps to solve one-step problems with practical contexts (for example: problems involving addition or subtraction of units, or problems about comparing quantities).	209	43.45	272	56.55
b) Grade 1 - Grade 2: Apply and present methods for solving one-step problems.	223	46.36	258	53.64
c) Grade 4: Use logical reasoning to perform mental calculations by applying the associative property of addition.	288	59.88	193	40.12
d) Grade 4: Apply the associative property of addition to accurately calculate the results of expressions.	258	53.64	223	46.36
e) Grade 4: Draw a rectangle or square using a ruler and set square.	283	58.84	198	41.16
f) Grade 4: Interpret and redraw the design diagram of a rectangular or square room using a ruler and set square.	227	47.19	254	52.81
Average		51.56		48.44

The data in the table above shows that 51.56% of teachers correctly identified the indicators of competency or skills, while 48.44% made incorrect selections. Although the percentage of correct responses is slightly higher, this suggests that teachers have a general ability to recognize the manifestations of mathematical competency, which can be considered an advantage in further refining their assessment practices.

*** Ability to Differentiate Between Criteria and Indicators Used to Assess Primary School Students (Question 10)**

Table 6. Ability to identify criteria and indicators corresponding to each teacher's task

Certain content representing criteria and indicators	Choose the right criteria		Choose the right indicator	
	Number	%	Number	%
a) Identify the smaller and larger numbers within 100.	329	68.4	15	3.19
b) Arrange numbers in order within 100.	349	72.56	10	2.1
c) Order numbers from smallest to largest within 100.	10	2.08	288	59.88

d) Compare two numbers within 100.	5	1.04	187	38.88
e) Determine the shortest distance by comparing the number of dots.	5	1.04	177	36.8
f) Apply number comparison within 100 to solve real-life problems.	354	73.6	15	3.19
Average		36.5		24

The table above shows that the average percentage of teachers participating in the survey who correctly selected the criteria and indicators for student assessment was below average, with figures of 36.5% and 24%, respectively. These results indicate that most teachers face challenges in identifying the appropriate criteria and indicators for student assessment.

Based on the survey results presented in the tables above, we can draw the following conclusions regarding teachers' understanding of mathematics competency assessment in teaching Mathematics with the goal of developing primary school students' competencies:

Most teachers have received training in assessing students' competencies in alignment with the Vietnamese General Education Program (2018). As a result, they are generally able to accurately identify student behaviors that correspond to each type of mathematical competency outlined in the Mathematics program (2018). Over half of the teachers in the survey are capable of distinguishing between competency indicators and skills. However, teachers still face challenges when classifying mathematical competency expressions across different levels. Additionally, teachers have not yet fully developed the ability to differentiate and identify assessment criteria and indicators. This presents a significant challenge for teachers when evaluating students' mathematical competency levels and tracking the development of these competencies.

CONCLUSION

The innovation of assessment activities to align with the new primary education program is essential. Practical research indicates that teachers' perceptions of assessment in teaching and developing students' mathematical competencies have evolved to some extent. However, as previously mentioned, teachers continue to face several challenges, which may stem from various factors. Competency-based assessment is a relatively new approach for both primary school teachers and educational administrators. While there are numerous training and professional development programs for teachers, the limited duration of these courses means they have not adequately addressed the specific challenges teachers face when implementing competency-based assessments. Teachers require more time to fully understand and apply assessment methods that align with the competency development goals of the Vietnamese General Education Program (2018).

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