



ISSN: 0975-833X

Available online at <http://www.journalcra.com>

International Journal of Current Research
Vol. 16, Issue, 01, pp.26876-26883, January, 2024
DOI: <https://doi.org/10.24941/ijcr.46522.01.2024>

**INTERNATIONAL JOURNAL
OF CURRENT RESEARCH**

RESEARCH ARTICLE

AN ANALYSIS OF THE ROLE OF TEACHERS IN THE APPLICATION OF COMPETENCY-BASED EDUCATION IN SENIOR SECONDARY SCHOOL MATHEMATICS EDUCATION IN SRI LANKA

***Fathima Ruzeika Fairoz**

Department of Education, Faculty of Social Sciences, Arts, and Humanities, Lincoln University College (LUC), Kelantan, Malaysia

ARTICLE INFO

Article History:

Received 19th October, 2023
Received in revised form
18th November, 2023
Accepted 15th December, 2023
Published online 19th January, 2024

Key words:

Competency-based Education,
Continuous Professional Development,
Motivation, Mathematics Education,
Assessment.

*Corresponding author:

Fathima Ruzeika Fairoz

Copyright©2024, **Fathima Ruzeika Fairoz**. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation: **Fathima Ruzeika Fairoz**. 2024. "An analysis of the Role of Teachers in the Application of Competency-Based Education in Senior Secondary School Mathematics Education in Sri Lanka.". *International Journal of Current Research*, 16, (01), 26876-26883.

ABSTRACT

Although Sri Lanka has achieved high success in school enrolment and literacy rates, the heavy examination orientation has adversely affected the student's total development. The three public examinations, Scholarship Examination, General Certificate of Education (Ordinary Level), and General Certificate of Examination (Advanced Level), receive too much attention from students, teachers, and parents, bringing too much stress on students. The study analysed the teachers' role in applying the Competency-Based Education system at the Senior Secondary Level of mathematics education from three perspectives: Initiate learning activities in a manner that will arouse interest among students, observe students to identify their positive and negative learning abilities, and promote learning by providing feedback on students' performance. The study employed a quantitative approach. A questionnaire was used as the primary data collection instrument. A stratified random sampling method was used to select a sample of 276 mathematics teachers who taught grades 10 and 11 from the Western Province of Sri Lanka. The findings revealed that the teachers were not fully aware of their roles and responsibilities in the CBE teaching-learning and assessment process, which hindered the application of CBE in the mathematics learning process at the senior secondary level. The findings lead to various recommendations, which include the Department of Education developing a mechanism to monitor the teaching-learning process regularly and providing teachers with adequate training where necessary. Further, implementing a competency-based assessment system to uplift the 21st-century skills within students. The aspects discussed would benefit policymakers, administrators, and teachers in enhancing the mathematics teaching-learning process.

INTRODUCTION

A well-informed and knowledgeable community is of vital importance for the economic and social development of modern society (Aturupane, Dissanayake, Jayawardene, & Shoji, 2011). With this intention, Sri Lanka introduced a Competency-Based Education (CBE) system in 2007. The main aim of this change was to create a generation that can change what is known, explore the new, and build up new skills that are required for the future (National Council of Teachers of Mathematics (NCTM), 2015). In this context, mathematics competency became crucial component in intelligent decision-making, daily life, and the dynamic work world (Wijesundera & Yatigammana, 2021). Though Sri Lanka has implemented a CBE approach, it is questionable to what extent it is practised in the teaching-learning process of mathematics (Egodawatte, 2014).

The present education system must overcome three barriers: The curriculum (Chandratilleke, Jayawardena, Mampitiya, & Widanapathirana, 2014), The assessment (Egodawatte, 2014), and The quality of education (Aturupane *et al.*, 2011). Inadequate educational quality mainly relies on the quality of the teaching-learning process. Improving education quality requires well-educated and trained teachers (Ali *et al.*, 2007). It is a national obligation that all children in the country have access to quality instructions in mathematics to achieve competencies in mathematics, which directly depends on the quality of teachers (Wijesundera *et al.*, 2021). With the implementation of the student-centred CBE curriculum in 2007, a new transformational role for teachers has been proposed to guide students to construct knowledge and derive meaning through their day-to-day experience (Seneviratne, 2012; Egodawatte, 2014). Though teachers had received good training on implementing CBE in mathematics, they could face different challenges in applying CBE in the teaching process.

Thus, this paper was focused on analysing teachers' role in applying CBE in the mathematics teaching-learning process at the senior secondary level, which was done in three perspectives, initiating learning activities to arouse interest among students, identifying students' positive and negative learning abilities, and promoting learning by providing feedback on students' performance. The current study analysed the teachers' role in applying CBE in the teaching-learning process of mathematics at the Senior Secondary level from the perspective of teachers at the school level.

Background

Sri Lanka has been committed to providing accessible, compulsory, quality education for all children regardless of race, religion, or ethnicity. The universal free education policy has been implemented (since 1945) to ensure that no child is left behind by providing access to education free of charge to all children from primary to tertiary level (Ministry of Sustainable Development, 2018). While the country has shown remarkable progress in achieving near universality in youth literacy rate, school enrolment, and primary education completion, the quality and relevance of education remain a significant challenge going forward. The present structure of the education system in Sri Lanka has six segments (Nawastheen, 2019): Preschool education, primary education, junior secondary education, senior secondary education, collegiate-level education, and tertiary education. After completing the General Certificate of Education Ordinary Level (GCE O/L) examination at the end of the senior secondary level, students have three paths to follow in the future. Enter senior secondary education to gain access to tertiary education, enter a technical college to pursue vocational training, and the rest enter the world of work. Under the present education system, all these three groups follow the same curriculum till the end of grade eleven (Gunawardena, 2013). To continue for the General Certificate of Education Advanced Level (GCE A/L), a student should at least pass six subjects with a minimum of three passes for the compulsory subjects, mother tongue, math, and science.

Though Sri Lanka has recently taken many measures to increase the quality of mathematics education, one of the main reasons for high dropout rates after GCE (O/L) is students' inability to pass mathematics. In 2021, 29.97% of the student population who sat for GCE (O/L) mathematics obtained a 'W,' which is a failure in mathematics (GCE (O/L) Examination 2021 Performance Report, 2021). Thus, this hindered these students' eligibility to enter the collegiate level, and they became school dropouts after GCE (O/L). These students who dropped out of school had attended school but had not acquired the knowledge or skills to enter the world of work. Thus, they joined the labour market without formal vocational training or employment skills that suit the needs of the ever-widening economy (Liyanage, 2014). The youth unemployment rate in Sri Lanka continued to be above 20% from 2020 to 2022 (Department of Census and Statistics, 2023). Recently, it revealed that highly qualified graduates must wait long for employment through government recruitment schemes in Sri Lanka. There is a continuous increase in employment and under-employment rates in the country despite having highly skilled human resources (Grero, 2019). Thus, most graduates engage in irrelevant jobs due to the mismatch between their qualifications and the job market (Ariyawansa, 2013). The Central Bank of Sri Lanka (2009) revealed that the principal issue is the need to bridge the mismatch between skills acquired through the education system and the labour market requirement.

To provide a high-quality mathematics education system, including 21st-century skills, the government of Sri Lanka introduced a new competency-based curriculum at the national level in 2007. The main aim of this change was to create a generation that can change what is known, explore the new, and build up new skills that are required for the future (NCTM, 2015). Although there is a growing interest in CBE, several difficulties and problems related to its application have been reported (Mustafa & Tacettin, 2021; Seneviratne, 2012). Though Sri Lanka has implemented a CBE system, it is questionable to what extent it is practised in the teaching-learning process of mathematics

at the senior secondary level and how far it has provided an equitable education (Egodawatte, 2014). The present education system of the country must overcome three barriers to achieve its objectives: 1. The curriculum (Chandratilleke *et al.*, 2014), 2. The assessment (Egodawatte, 2014), 3. The inadequate educational quality (Aturupane *et al.*, 2011). Inadequate educational quality mainly relies on the quality of the teaching-learning process. Quality of education requires well-educated and trained teachers (Ali *et al.*, 2007). With the implementation of the student-centred CBE curriculum in 2007, a new role for teachers has been proposed to guide students to construct knowledge and derive meaning through their day-to-day experiences (Seneviratne, 2012). Though teachers have received suitable training during the implementation stage of CBE, they could face different challenges in applying to the curriculum. Thus, teachers continued using traditional teaching methods even after training in CBE approaches. The study mainly analysed the role of teachers in the application of the CBE-based mathematics teaching process at the senior secondary level from three perspectives: Initiate learning activities in a manner that will arouse interest among students, observe students to identify their positive and negative learning abilities, and promote learning by providing feedback on students' performance. The study intended to analyse teachers' current understanding and practices (the role of teachers) in the CBE-based teaching-learning process of mathematics at the senior secondary level from the perspective of teachers at the school level.

Literature Review

Constructivism: According to Vygotsky's social constructivism theory (1968), people gain cognitive abilities through social guidance and construction. The society or the culture that the learner belongs to holds a great responsibility in developing and forming abilities like memory, learning, problem-solving, and attention in the learner. The constructivist educational philosophy highlights that students create their knowledge, and teachers scaffold to construct their knowledge.

Competence: According to Jallow (2011), competency is a statement of learning outcomes for a skill or body of knowledge. He further stated that when students demonstrate competency, they demonstrate their ability to do something (showing the outcome of the learning process). According to Tambwe (2017), competency refers to an integrated set of skills, knowledge, and attitudes that enable one to effectively perform the activities of a given occupation or function to the standards expected at school and later in public, in the private sector, or for self-employment. In the current study, competency refers to a set of skills, knowledge, and attitudes that students need to have achieved to be successful in their school activities and, after that, in the world of work.

Competency-Based Education (CBE): The CBE system mainly builds on Vygotsky's social constructivism theory, where teachers help students construct their knowledge. Five basic characteristics are essential for a CBE education programme. They are advancement, objectives, assessments, support, and skills training (Egodawatte, 2014). Competency-based learning refers to systems of instruction, assessment, grading, and academic reporting based on students demonstrating that they have learned the knowledge and skills they expect to learn as they progress through their education (The Glossary of Education Reforms, 2014). CBE education focuses on what students can do rather than what they can learn about (Tambwe, 2017). Also, it mentions that training to become a competency-based educator requires studying various teaching and learning theories that focus on learning outcomes with specific, measurable definitions of knowledge, skills, and learner behaviour.

CBE and Mathematics Education: CBE encourages students to learn to think and act like a mathematician. Thus, students will experience and engage with mathematics through processes integral to the discipline. Each process threaded through all planning stages, task design, teaching and learning, and assessment. Mastery of learning outcomes is demonstrated through curricular proficiency and these mathematical processes.

Fundamental mathematical processes, integral to daily instruction and planning, can be categorised as problem-solving, reasoning and proof, communication, connections, and representation (NCTM,2000).

What is the Role of Teachers in the CBE Based Teaching-Learning Process at Senior Secondary School Mathematics Education in Sri Lanka?: The Sri Lankan curriculum documents indicate that a teacher's primary function in performing a transformational role includes initiating the activities in a manner that will kindle interest, planning the learning environment with the necessary material and other facilities, closely observing how students learn, identifying students' abilities and inabilities and promoting student learning by providing feedback, paying close attention to student presentations and discussions and preparing instruments for the extension of learning beyond the classroom

Initiating learning activities in a manner that will arouse interest among students: Teacher preparedness for lesson development is essential to attaining the lesson objectives during concept formation in the mathematics classroom. According to Adams *et al.* (2021), learners in the classroom tend towards a unique learning style, which overlaps several learning styles. Therefore, it is beneficial for the teacher to understand the learners' preferred learning styles and identify the learning activities accordingly before the lesson. Teachers must allow students to construct their knowledge rather than act as conveyors and assessors of knowledge. Thus, students would own their learning (Adams *et al.*, 2021). Further, CBE requires three specific attributes that should be folded into teaching practices to be successful: a focus on an intimate knowledge of learning standards to monitor student progression and help students set learning goals for themselves, an emphasis on teaching strategies and resources that engage and empower students to oversee their learning; and a clear plan for students to become cooperative learners. Teachers should include relevant and appropriate activities with concrete objects to teach a relevant math concept. Mathematics seems logical when students develop their knowledge through actions (Kytmanov, Noskov, Safonov, Savelyeva, & Shershneva, 2016). According to Dalman *et al.* (2020), teachers must use various ways to enhance student's interest and curiosity, including asking questions, using language that is not monotonous, guiding students' creativity, using multi-method and multimedia, and giving assignments individually and in groups to students.

Additionally, teachers should regularly conduct self-evaluation of their teaching methodologies and instructional practise to avoid losing interest and stay focused on the learning process (Wijesundera *et al.*, 2021). Furthermore, implementing group activities toward discovery learning inculcates cooperative learning among students. Also, teaching should include more hands-on activities and group work when conducting algebraic lessons in inclusive mathematics classrooms. In contrast, though teachers have an idea of CBE, they usually do not practice it in their daily teaching process (Lukindo, 2016). Teachers prefer the question-and-answer method most in their teaching process. Sometimes, teachers use lecture methods due to the large class size. Further, techniques such as problem-solving, project, and group work were occasionally used. Further, most activities are based on subject content rather than real-life situations (Egodawatte, 2013). According to Wijesundera *et al.* (2022), limited opportunities provided for active learning are weaknesses that affect the development of students' reasoning, problem-solving, communication, and representation skills. However, most teachers cannot prepare a competency-based lesson and even deliver lessons using CBET approaches (Tambwe *et al.*, 2017). Their teaching mode is more traditional than complying with CBE because the new curriculum does not go hand in hand with improving other facilities, such as teaching resources. Teachers should be knowledge experts, coaches, and facilitators of students' learning process (Misbah, 2019). Teachers are critical to students' mathematics success (Ontario, 2020). Thus, teachers are responsible for ensuring that all students receive the highest quality of mathematics education, which requires them to have high expectations of all students and to view all students as capable math learners.

Issues such as students' lack of motivation, fear of mathematics, and lack of prior knowledge imply the need to implement context-based solutions that teachers can plan and implement collaboratively through SBPTD. Reflective actions implemented by teachers in classroom-based action research will shape teachers' beliefs, and such actions can be used to favourable attitudes toward learning mathematics among students and improve achievements (Wijesundera *et al.*, 2021). Both teachers and learners need to be motivated to implement competence-based teaching and learning. On their side, teachers must be motivated to help learners develop the required skills (competencies) (Mkonongwa, 2018). Further, the learners will be motivated to learn skills if they have been informed about the value of such skills in their daily lives. The curriculum forces many learners to learn things they do not know, such as why they are learning and how and where they can apply such knowledge and skills in their daily lives. As a result, they become rote learners who rely very much on memorization and less on understanding.

Observe Students to Identify Their Positive and Negative Learning Abilities: A particular weakness in the adaptation of teaching is the lack of attention to setting differentiated tasks to suit different ability levels of students. Providing additional support for slow-paced learners was also not frequently observed (Wijesundera *et al.*, 2021). Students enter school at various stages of development, with varied skills and external factors impacting their learning, behaviour, and development Adams *et al.* (2021). Thus, ensuring progress for students who fall behind is a crucial responsibility of a teacher in the CBE teaching-learning process. CBE requires that students progress at their own pace. Personalised learning cultivates an understanding of themselves as learners and turns over some of the work to the students themselves (KnowledgeWorks, 2018). Transparency about learning expectations and students' achievement levels at various stages are critical components of success in the CBE system. Teachers must have the support and freedom to holistically understand and support each child. Thus, many teachers use data notebooks with students to involve the kids in goal setting and progress monitoring. Students set goals and reflect on how they learn best. Students' assessment should be considered an integral part of instruction. Each instructional activity allows the teacher to assess and for students to learn. Using a more realistic and continuous assessment, the teacher can illustrate a clearer picture of their students' achievement levels. According to (Adams *et al.*, 2021), teachers should constantly know where their students stand; at any given time, a student may advance a level. CBE teachers must identify this advancement and restructure the learning for the student, guaranteeing learning continues to progress.

Teachers bring enthusiasm and skill in providing varied and equitable instructional and assessment approaches to the classroom, addressing individual students' identities, profiles, strengths, and needs and ensuring equitable, accessible, and engaging learning opportunities for every student (Ontario, 2020).

Promote learning by providing feedback on their performance: The allocation of marks for assessment and evaluation is a mode of providing feedback (Egodawatte, 2013). Group work is the standard teaching methodology in the curriculum. While end-of-year summative assessments are still a reality for schools, teachers in a personalised learning environment must be comfortable with frequent, embedded student assessments (KnowledgeWorks, 2018) to quickly align results to support students. After an assessment, students can also chart their growth and set their own learning goals, determining what they will do to reach their goal and what they need their teacher to do. Routine classroom activities provide assessment opportunities. So that all participants have a chance to conduct assessment observations and collect evidence of competence (Abdullah *et al.*, 2021). Students' assessment should be considered an integral part of instruction. Each instructional activity could be seen as an opportunity for the teacher to assess and for students to learn. According to Karunanithy *et al.* (2016), teachers frequently spend much time testing students through questions. It is revealed that teachers spend about a week on revision, which is mainly based on lower order

thinking before the test. Further, the entire term test scheme being summative content content-loaded negates the purpose of having School-Based Assessments (SBA) to support formative assessments linked to teaching-learning. Thus, the suggested assessment and evaluation methods do not examine whether students have achieved competencies. Teachers seem to differ in how they perceive students' learning experiences (Lukindo, 2016). Further emphasising, Bandara (2014), revealed that the most common method of testing students was a written test. 90% of the teachers used written tests, 70% group work, and practical tests as the most common practices of assessments. According to the guidelines provided by the Ministry of Education (MoE) 2008, there are 23 assessment methods. According to the author, unfortunately, only 20% of the teachers indicated using these methods, which MoE specified. According to Ontario (2020), teachers can clearly illustrate what their students have learned using a more realistic and continuous assessment. This information can be reported further through a descriptive assessment process that maps all stages students pass through until they can demonstrate an understanding or skill. Thus, it describes everything students can perform in the assessment process. Also, it reveals what students have achieved and explains how learning has changed the student. Generally, teachers assess whether a child can perform the allocated tasks. When they can, they can move to the next level, but if the student cannot perform the task, the teacher knows that further hands-on activities should be provided for the student to achieve proficiency. Students will achieve the targets at different times. Some will take a longer time than others. Students' assessments should be considered an integral part of the instruction (Abdullah *et al.*, 2021). Further, each activity could allow teachers to assess and students to learn. Also, with more realistic and continuous assessments, the teachers could clearly illustrate what the students had achieved.

Significance of the Study: The current study analysed the teachers' practices in the CBE-based, teaching-learning process of mathematics at the senior secondary level. The analysis was based on the three specific objectives of the study. Finally, it has given recommendations on how the teachers' role could be improved to enhance mathematics education at the senior secondary level. The findings and the recommendations would directly benefit the teachers, the administrators, and the curriculum developers to improve the quality of the CBE teaching process of mathematics. Also, it benefits researchers in future studies.

Conceptual Framework of the Study: Figure 1 gives the conceptual framework of the study. The current practices of senior secondary mathematics teachers were analysed through three indicators, initiating learning activities in a manner that will arouse interest among students, observing students to identify their positive and negative learning abilities, and promoting learning by providing feedback on students' performance (assessments).

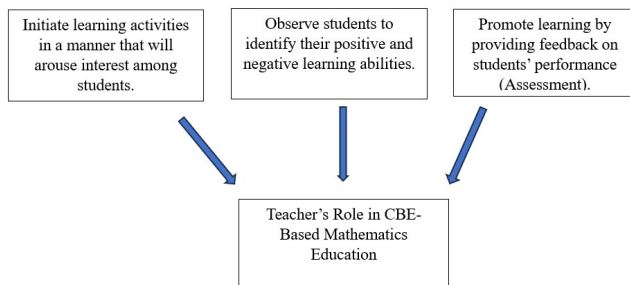


Figure 1. Conceptual Framework of the Study

MATERIAL AND METHOD

Research Design: The current study employed a cross-sectional survey research approach with a quantitative data collection method. The study adopted a quantitative method because quantitative techniques are powerful at studying large groups of people and generalizing from the sample being studied to broader groups beyond that sample (Holton & Swanson, 2009).

Population and Participants: The population of the study was the lower secondary mathematics teachers who taught grade 10 and 11 classes in the Western Province of Sri Lanka. The schools in Sri Lanka were categorised into four main groups, 1AB schools (schools with GCE A/L classes with science stream), 1C schools (schools with GCE A/L classes other than Science stream), Type 2 schools (schools with classes up to GCE O/L) and Type 3 schools (elementary schools with classes up to grade 8). The sample consisted of 276 teachers who taught mathematics in grades 10 and 11 from national and private schools in the Western Province. Western Province, consisting of three districts, Colombo, Gampaha, and Kalutara, has the most significant number of government and private schools by functional grade and the most populated schools.

Table 1. Sample Selection of the Study

District	1AB	1C	Type 2
Colombo	58	40	7
Gampaha	40	52	9
Kalutara	30	32	8
Total	128	124	24

Sample Selection of the Study: Table 1 gives the sample selection of teachers. 276 mathematics teachers were chosen from 1AB, 1C, and Type 2 schools of the three districts. The sample was selected using stratified random sampling.

Data Collection Instrument: A survey questionnaire was formulated based on the attributes of previously conducted studies adapted to the Sri Lankan context. It consisted of four sections. Section A: demographic information of the teacher sample, Section B: identifies how teachers initiated learning activities in a manner that would arouse interest among students. Section C: identifies whether teachers observe students to identify their positive and negative learning abilities, and Section D: identifies whether teachers promote learning by providing feedback on their performance. Participants indicated their level of agreement according to a Likert scale from strongly agree to disagree strongly. A pilot test was conducted with 20 mathematics teachers in the Western Province.

Procedure and Data Collection: The author personally collected data by visiting the schools and using a Google form. The researcher obtained prior permission from The Ministry of Education (MoE) and The Department of Education (DoE) (Western Province) to collect data from selected schools.

RESULTS AND DISCUSSION

The quantitative data was tabulated and statistically analysed using IBM SPSS Statistical Analysis version 26. The data was statistically analysed using descriptive statistics such as frequency, percentages, mean, and mode. Data presentation was done using frequency tables, bar charts, and histograms.

The Findings: According to Table 2, 4.3% of the teachers were between 20 to 30 years of age, and 65.2% of the teachers were above 40 years of age. Nineteen-point-six per cent had experience as a teacher for more than 26 years, and 32.6% had less than ten years of experience. Seventy-two per cent of the teachers were graduates or more qualified.

On the other hand, 23.9% of the teachers were only trained teachers. Sixty-three per cent of the mathematics teachers had done mathematics in their bachelor's degree, whereas 36.9% of teachers had not done mathematics as a subject in their higher studies. Fifty-four-point-three per cent of the teachers worked more than 30 periods a week. The mean number of periods a teacher worked for a week is 29.78. Fifty-six-point-one per cent of the teachers taught classes with more than 30 students. The mean number of students in a class was 33.91.

Table 2. Profile of the teacher sample

Teacher Characteristics	Categories	Percentage (%)
Age	20 - 30	4.3
	31 - 40	30.4
	41 - 50	43.5
	50 or more	21.7
	Total	100
Gender	Male	28.3
	Female	71.7
	Total	100
Experience	0 - 10	32.6
	11 -20	41.3
	21 - 25	6.5
	26 or more	19.6
	Total	100
Educational Qualifications	Trained	23.9
	Graduate	45.7
	Post Graduate Diploma	28.3
	Masters	2.2
	Total	100
Major Subject in the Bachelor's Degree	Maths	63
	Chemistry	4.3
	Other	32.6
	Total	100
Number of Periods Teach for a Week	16 -20	6.5
	21 - 30	39.1
	More than 30	54.3
	Total	100
Number of Students in the Class	11- 20	6.5
	21- 30	37
	31 - 40	17.4
	41 - 50	39.1
	Total	100

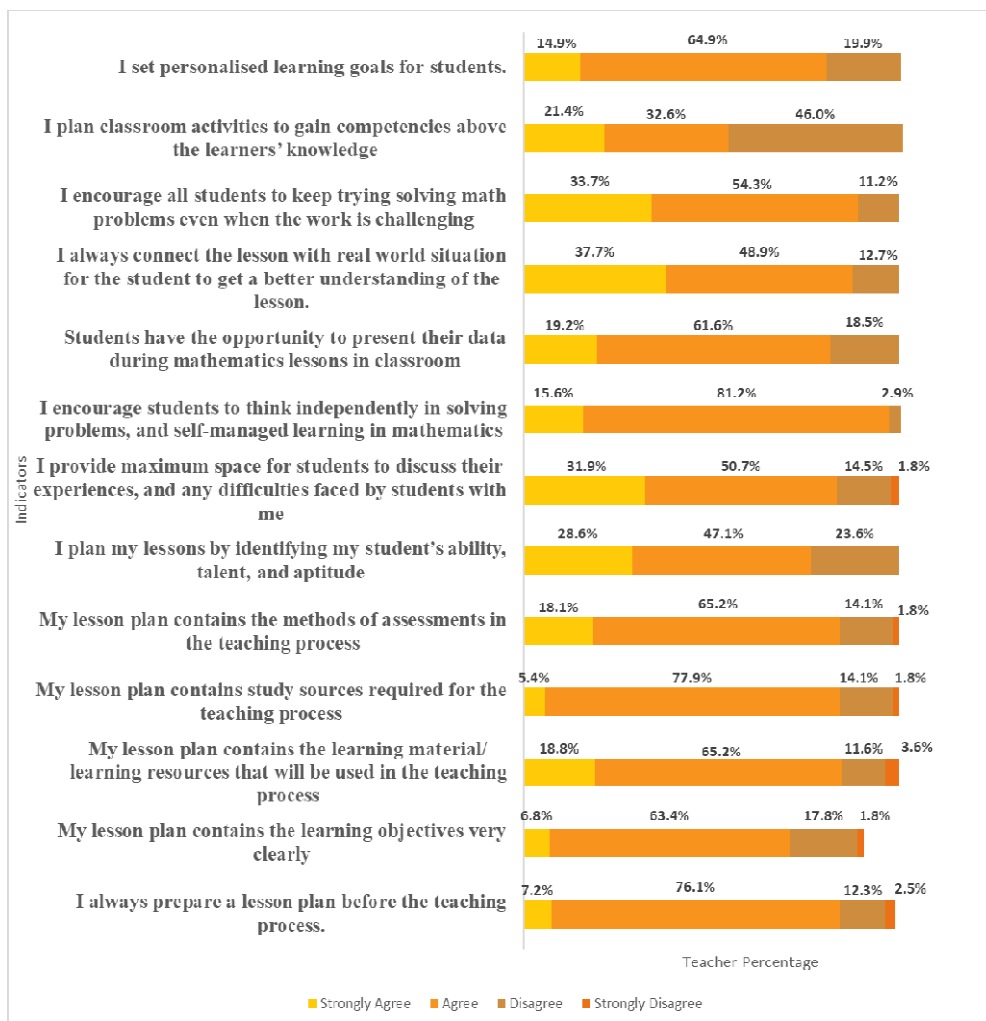


Figure 2. Responses for the indicators of initiating learning activities in a manner that will arouse interest among students

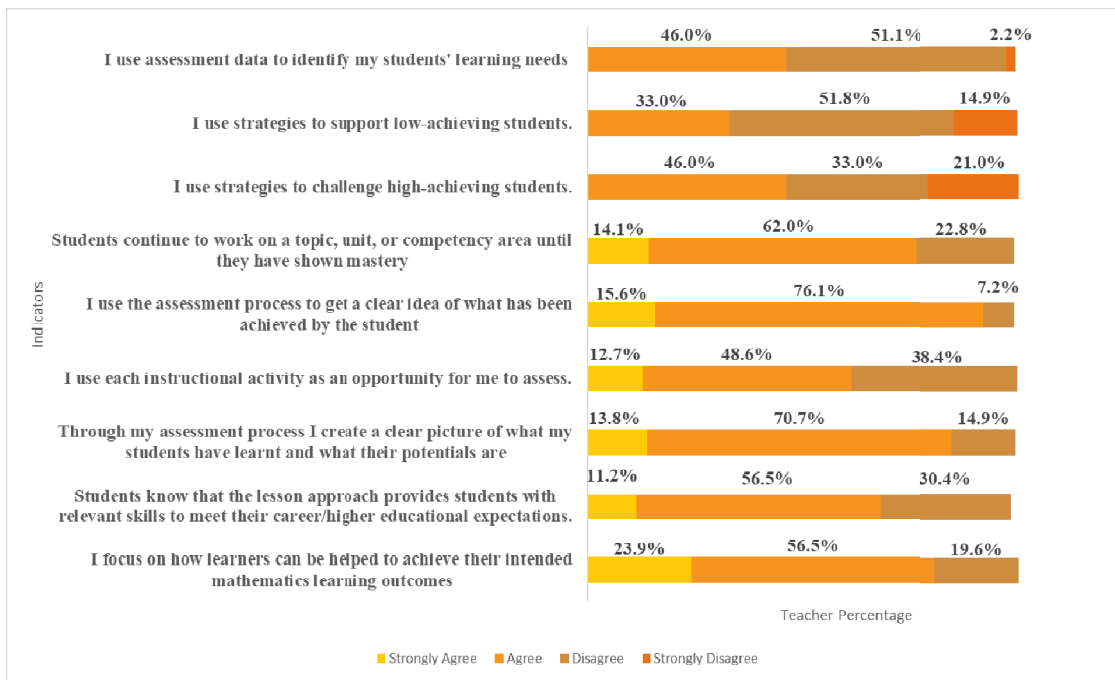


Figure 3. Responses to the indicators to analyse observing students to identify their positive and negative learning abilities

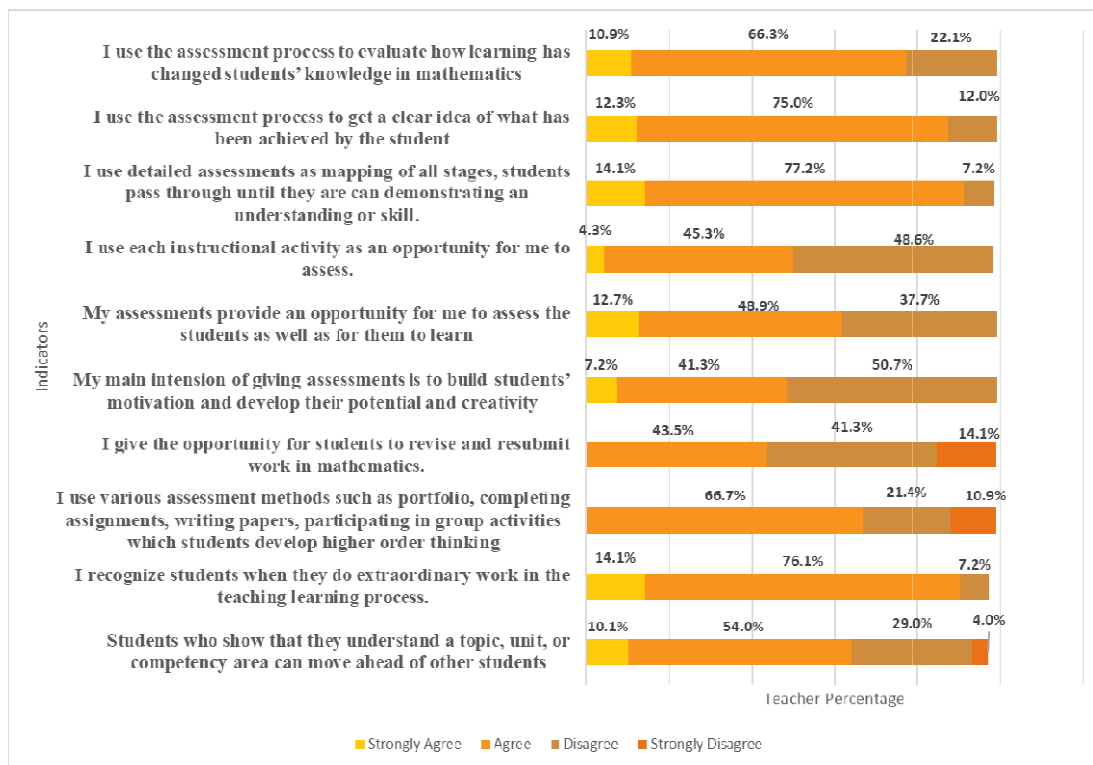


Figure 4. Responses for the indicators to analyse promote learning by providing feedback on students' performance (Assessments)

Initiating learning activities in a manner that will arouse interest among students: Initiating learning activities in a manner that will arouse interest among students was analysed using thirteen indicators. Figure 2 gives the responses for indicators of initiating learning activities in a manner that will arouse interest among students. Ninety-six point eight per cent agreed they encouraged students to think independently in solving problems and self-manage learning mathematics. Around 20% disagreed that they set personalised learning goals for students. Similarly, around 26% disagreed that they plan their lessons by identifying their students' abilities, talents, and aptitudes. Further, 46% indicated they did not plan classroom activities to gain competencies above the learner's knowledge, but 83.3% agreed they always prepare a lesson plan before the teaching process.

Up to 20% disagreed with the rest of the indicators to analyse the teacher's role in initiating learning activities in a manner that would arouse interest among students.

Observe students to identify their positive and negative learning abilities: Nine indicators were used to analyse observing students to identify their positive and negative learning abilities. According to Figure 3, 53.3% disagreed that they did not use assessment data to identify their students' learning needs. Also, 38.4% disagreed that they used each instructional activity as an opportunity for them to assess their students. Thirty-four per cent disagreed that their students knew the lesson approach provided them with relevant skills to meet their career/higher educational expectations.

In contrast, 91.7% agreed they used the assessment process to understand what students have achieved clearly.

Promote learning by providing feedback on students' performance (Assessments): Figure 4 gives the responses for the indicators to analyse teachers promote learning by providing feedback on students' performance. According to the figure around forty-nine per cent disagreed that they used each instructional activity as an opportunity for them to assess students, and 37.7% disagreed that these assessments provided an opportunity for the students to assess themselves. Fifty-one per cent indicated that their main intention of giving assessments was to build students' motivation and develop their potential and creativity. In contrast, 90.2% agreed they used detailed assessments to map all stages students pass through until they could demonstrate an understanding or skill. Further, to get a clear idea of what students had achieved and recognise students when they did extraordinary work in the teaching-learning process, thirty-two per cent of the respondents disagreed that they used various assessment methods in their teaching process—similarly disagreed on allowing students who showed that they understood a topic, unit, or competency to move ahead of the other students.

DISCUSSION

Analysing the teachers' role in the CBE-based mathematics teaching-learning process was done under three perspectives:

- Initiating learning activities to arouse interest among students.
- Observing students to identify their positive and negative learning abilities.
- Promoting learning by providing feedback on their performance.

In the current study, 83.3% agreed that they prepare lesson plans before the lesson. Similarly, in Egodawatte (2013), 23.6% disagreed that they plan their lessons by identifying their students' abilities, talents, and aptitudes when they plan their lessons. However, confirming Wijesundera *et al.* (2021) and KnowledgeWorks (2018), 79.8% disagreed with setting personalised learning goals for students. Karunanithy *et al.* (2016) mention that teacher preparedness for lesson development is essential to attaining the lesson objectives. In the current study, 83.3% agreed that they always prepared a lesson plan before conducting the lesson. In contrast to Tambwe (2017), 70.2% agreed that their lesson plan contained learning objectives, learning material/resources, and study sources. However, in contrast to Adam *et al.* (2021), 46% disagreed that they plan classroom activities to gain competencies above the learners' knowledge. As highlighted in Kytmanov *et al.* (2016), 96.7% agreed that they encouraged students to think independently in solving problems and self-manage mathematics learning. In contrast to Dalman *et al.* (2020), 32.3% disagreed that they provided students with various methods of learning and assessments that develop higher-order thinking abilities. Limited opportunities were provided for students to improve their reasoning, problem-solving, communication, and presentation skills. Also, in contrast to Wijesundera (2022), in the current study, 80.8% agreed that they allowed students to present their data to the class, and 85.6% agreed that they connected their lessons with real-world situations. As highlighted in Misbah (2019), in the current study, 80.4% of the teachers agreed that they were trained to help learners achieve their intended mathematics learning outcomes. In contrast to Ontario (2020), more than 54% of the teacher sample disagreed that they use strategies to challenge high-achieving students, and 50.5% disagreed that their assessment activities did not motivate students and build creativity. Confirming Wijesundera *et al.* (2021), 66.7% disagreed with providing strategies to low-achieving students, but 97.1% used assessment data to identify their student's needs and to get a clear idea of what they had achieved. Confirming Mkonongwa (2018), 30.4% disagreed that their students were educated that the CBE approach would provide students with relevant skills to meet their career/higher educational expectations. Confirming Adam *et al.* (2021), 48.6% disagreed that

they used each instructional activity as an opportunity for them to assess. 92.8% used their assessment process to understand what their students had learned and their potential. Confirming Lukindo (2016), Bandara (2014), and Egodawatte (2013), around 32.3% of the teacher sample disagreed that they used various assessment methods such as portfolios, completing assignments, writing papers, and participating in group activities in which students develop higher-order thinking. Moreover, 55.4% disagreed that they allowed students who showed they understood a topic unit or competency area to move ahead of the other students. Further, 55.4% disagreed that they allowed students to revise and resubmit work; their primary intention of giving assessments was to build students' motivation and develop their potential and creativity. In contrast to Karunanithy *et al.* (2016), 48.6% disagreed they used each instructional activity as an opportunity for them to assess the students and 32.3% disagreed they provided various assessment methods. In contrast to Abdullah *et al.* (2021), 37.7% disagreed that their assessments provided an opportunity for them to assess the students as well as for the students to learn. In contrast to Adam *et al.* (2021), 22.1% disagreed that they used the assessment process to evaluate how learning changed students' mathematics knowledge.

CONCLUSION

The study, An Analysis of the Role of Teachers in the Application of Competency-Based Education in Senior Secondary School Mathematics Education in Sri Lanka, mainly explored teachers' role in applying CBE in the senior secondary level mathematics teaching-learning process. The author adopted a quantitative approach, and data was collected through a survey questionnaire administered to 276 grade 10 and 11 mathematics teachers in the Western Province. The results indicated that although teachers had degree qualifications, only 63 % of teachers had offered mathematics as a subject in their first degree. Around 32.6% of teachers had no qualifications to be middle school mathematics teachers. It was revealed that the workload of the teacher sample was relatively high, and there were too many students in the classroom. It was also revealed that understanding the principles of CBE-based mathematics teaching and assessment needs improvement. Although most teachers prepared lesson plans before the lesson, teachers did not consider students' abilities, talents, and aptitudes when preparing them. Also, most teachers did not set personalised learning goals for students in their lesson plans. Although most provided activities for students to think independently when solving problems, they needed to identify strategies for providing challenging tasks to motivate students. Also, teachers should provide challenging tasks for the highest-achieving students and improve the standards of low-achieving students. Further, most teachers did not adapt their teaching to engage students in the teaching-learning process by providing activities related to real-world applications. It was shown that student did not see the relevance of mathematics in their daily activities. Students must see why they learn mathematics to motivate them to learn mathematics as a subject. Teachers did not use the above strategies in their teaching-learning process.

Most teachers used assessments to monitor students' progress. Regarding assessments, most teachers did not use various challenging activities, encourage classroom discussions, and present the findings to the class. Also, teachers must be trained to assess students using each teaching-learning activity or conduct formative assessments. Also, teachers did not use various assessment methods to improve higher-order skills and logical thinking. Teachers and students should be able to assess students' current level of achievement, take corrective measures, and evaluate how learning had changed students' knowledge of mathematics.

RECOMMENDATIONS

According to the findings, the current classroom teaching-learning and assessment practices must be improved. Teachers must be trained to identify ways to improve student motivation by using more

student-centred approaches, relating mathematics to daily life, providing various activities in the teaching-learning process and assessment activities, and giving opportunities for students to communicate mathematical ideas to the classroom. Also, teachers should be encouraged to identify students' different knowledge levels and cater to their needs. Teachers should use dynamic assessment methods and data to provide feedback and recommendations to students to improve. Also, DoE and school authorities must monitor teachers, identify professional development needs, and periodically provide them with professional development programmes and in-service training programmes. School authorities should provide teachers with School Based Development (SBD) programmes and Lesson Study approaches to observe other teachers and discuss and plan their lessons collaboratively. Also, teachers should be encouraged to carry on classroom-based action research, allowing teachers to reflect upon their teaching and make necessary changes to improve students' achievement levels.

Limitations and Future Work Direction: Although the author intended to collect data from all nine provinces of Sri Lanka, the high cost due to the economic crisis and political instability prevailed in the country, data collection was limited to the Western Province. Due to the difficulty of getting permission to visit private schools, only one private school from the Western Province was selected to collect data. Collecting data from various government and private schools is recommended for future studies. Thus, the findings could be affected by the spread of teachers and limitations of the data collection instruments used by the author. It is recommended that future studies be conducted province-wise to get a clear idea of teachers' current practices in their teaching-learning role. In the current study, the data collection instrument was not geared to collect in-depth information on the role of teachers in the CBE-based teaching-learning process. The current study adopted a quantitative approach to analyse the teachers' role in applying CBE in the mathematics teaching-learning process. A mixed method for data triangulation may be more helpful in enriching, elaborating on, and analysing the role of teachers (Beverly, Catherine, & Stephen, 2011). The study was conducted at the school level from the perspective of teachers. It is recommended that the views of students, school administrators, and authorities be considered in future studies.

REFERENCES

Abdullah, G., Haris, I., Husain, R., Ilham, A and Pulkadang, W. 2021. Improving the Quality of Competency-Based Assessment through a Classroom Training Activity. *MEXTESOL Journal*, Vol 45, No.2.

Adams, M., Bingham, A. J and Stewart, R. L. 2021, 1 3. Competency-Based Education:Examining Educators' Experiences. *The Qualitative Report*, 263, 674-695.

Ali, S., Barrett, A., Clegg, J., Hinostroza, J. E., Lowe, J., Nikel, J., Yu, G. 2007. *Initiatives to improve the quality of teaching and learning- A review of recent literature*. United Nations Educational, Scientific and Cultural Organization. EdQual.

Ariyawansa, R. G. 2013. Employability of Graduates of Sri Lankan Universities. *Sri Lankan Journal of Human Resource Management*, 21.

Aturupane, H., Dissanayake, V., Jayawardene, R and Shojjo, M. 2011. *Strengthening Mathematics Education in Sri Lanka*. South Asian Human Development Sector.

Bandara, J. M. 2014. *Enhancing Eleventh Graders' Understanding of "Different Solvents and Their Applications" Using School-based Assessment SBA*. Unpublished M.Sc. Thesis submitted to the Postgraduate Institute of Science, University of Peradeniya.

Bandaranayake, R and Turner, H. 2018, January/July. A Quantitative Study on Mathematics Anxiety as a Predictor of Achievement Among GCE O/L Students in Sri Lanka. *Education Perspective*, 7.

Chandratilleke, K. L., Jayawardena, R. C., Mampitiya, U and Widanapathirana, S. 2014. *Study on Curriculum Development in General Education in Sri Lanka*. Retrieved from <http://nec.gov.lk/wp-content/uploads/2016/04/1-Final-6.pdf>.

Egodawatte, G. 2013. An analysis of the competency-based secondary mathematics curriculum in Sri Lanka. *Springer Science+Business Media Dordrecht*.

Egodawatte, G. 2014. An Analysis of the Competency-Based Secondary Mathematics Curriculum in Sri Lanka. *Educational Research for Policy and Practice*.

Grero, M. L. 2019. Mismatch Between the Education System and the Job Market in Sri Lanka with Special Reference to Soft Skills. In M. L. Grero.

Gunawardena, E. 2013, March 23. An Analysis of the Competency-Based Secondary Mathematics Curriculum in Sri Lanka. *Educational Research for Policy and Practice*, 131. doi:DOI 10.1007/s10671-013-9145-5

Holton, E. F and Swanson, R. A. 2009. Foundations and Methods of Inquiry. *Research in Organizations*.

Karunanithy, M., Karunaratne, S., Mudalige, U. K and Sedere, U. 2016. *Study on Evaluation & the Assessment System in General Education in Sri Lanka*. National Education Commission.

KnowledgeWorks. 2018, February 9. Retrieved from <https://knowledgeworks.org/resources/role-teacher-personalized-competency-based-classroom/>.

Kytmanov, A., Noskov, M. V., Safonov, K., Savelyeva, M. V and Shershneva, V. A. 2016. Competency-based Learning in Higher Mathematics Education as a Cluster of Efficient Approaches. *Bolema Boletim de Educacao Mate*, 3056, 1113-1126. doi:<http://dx.doi.org/10.1590/1980-4415v30n56a14>

Liyanage, K. 2014. *Education System in Sri Lanka: Strengths and Weaknesses*. Retrieved from https://www.ide.go.jp/library/Japanese/Publish/Reports/InterimReport/2013/pdf/C02_ch7.pdf.

Lukindo, J. J. 2016. Exploring Competency-Based Education CBE in Rural Secondary Schools in Tanzania:English Language Teachers' Conceptions and Experiences. *Journal of Education and Practice*, 7.

Ministry of Sustainable Development, W. a. 2018, June. *Voluntary National Review on the status of implementing the sustainable development Goals*. Retrieved from https://sustainabledevelopment.un.org/content/documents/19677FINAL_SriLankaVNR_Report_30Jun2018.pdf.

Misbah, Z. 2019. Teacher-student interaction in competence-based vocational education in Indonesia. *Education and Learning Science, WASS*.

Mkonongwa, L. M. 2018. Competency-based teaching and learning approach towards quality education. <https://www.tenmet.org/wp-content/uploads/2018/12/Competency-based-teaching-and-learning-approach-towards-quality-education.pdf>.

Nawastheen, F. 2019, July. Educational and Curriculum Changes in Sri Lanka: In Light of Literature. *Muslim Journal of Social Science and Humanities*, 33, 342-361.

Ontario. 2020. *Roles and Responsibilities in Mathematics Education*. Retrieved from <https://www.dcp.edu.gov.on.ca/en/curriculum/elementary-mathematics/context/roles-and-responsibilities-in-mathematics-education#parents>.

Seneviratne, D. V. 2012. Problems Encountered by Teachers in the Implementation of the Basic Features of Competency-Based education CBE in the classroom. *Institutional Repository, University of Colombo*.

Tambwe, M. A. 2017. Challenges Facing Implementation of Competency-Based Education and Training CBET System in Tanzanian Technical Institutions. *Education Research Journal Vol. 711: 277 – 283*.

Wijesundera, S and Yatigammana, S. 2021. Mathematics teachers' beliefs of students' low achievement at the secondary level of education in Sri Lanka. *7th International Conference on Humanities and Social Science IRCHSS - 2021*. Sri Jayawardanepura.

Wijesundera, S and Yatigammana, S. 2021. Mathematics teachers' beliefs of students' low achievement at the secondary level of education in Sri Lanka. *7th International Conference on Humanities and Social Science IRCHSS - 2021*. Sri Jayawardanepura.