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## Zooming into the Lived Experiences of Mathematics Teachers in the Implementation of the Claim-Evidence-Reasoning (CER) Approach

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### ABSTRACT

Mathematics educators are constantly searching for new and innovative approaches to teaching with the goal of improving student learning outcomes. This phenomenological study aimed to describe the lived experiences of mathematics teachers in implementing the Claim-Evidence-Reasoning (CER) Approach. The study was participated by 13 mathematics teachers, and data were gathered through in-depth interviews and a focus group discussion. Thematic analysis was used to interpret the data guided by Colaizzi's method. Findings revealed that participants experienced struggles in instruction and assessment, adapted growth mindset and employed support systems, had milestones in the implementation of the CER Approach, and were open to continuous personal and professional development. Furthermore, the teachers' resiliency and adaptability in the process and the school's support helped overcome the issues encountered in implementing the CER Approach. The findings imply that the use of CER Approach have the potential to improve the reasoning skills of students in mathematics. Further, it is recommended that mathematics teachers continue to utilize the approach and that educational institutions should provide proper training to teachers through In-Service Training (INSET).

### INTRODUCTION

Educational institutions worldwide worked hard to offer students high-quality education over the years, and they continue to look for innovative ways to enhance curricula and pedagogies for teaching-learning mathematics. In line with this, school administrators provide opportunities for their teachers to attend various professional development activities such as seminars, training, and workshops (Martinez & McAbee, 2020). As a result, teachers get motivated (Shepherd-Jones & Salisbury-Glennon, 2018) and adopt and incorporate local or international techniques learned from seminars and training that are pertinent to the contexts of the students. The implementation of these various approaches to teaching is expected to increase student performance (Fisher et al., 2018); however, in the Philippines, there are still institutions that require improvement, as attested on different national and international achievement tests.

The Program for International Student Assessment (PISA) of the Organization for Economic Cooperation and Development (OECD) evaluates the math, science, and reading abilities of 15-year-olds periodically every three years. According to the most recent evaluation in 2018, most Filipino students' proficiency levels (80.70%) were rated as below Level 2, with 54.4% of them falling below Level 1. Only one in five students (19.7%) in the Philippines obtained proficiency levels 2 to 4. These students are able to use fundamental formulas, processes, algorithms, or conventions to answer whole-number issues. Only 0.01% of students achieved proficiency levels 5 to 6 in their work. They are able to create and use models for challenging circumstances, defining limitations, and making assumptions. Along with a command of formal

and symbolic mathematical operations and relationships, they can use this understanding and insight to create new approaches and strategies for challenging situations. Description of the proficiency scale of Mathematical Literacy shows that a low proportion of Filipino students obtained levels 2 to 4, while reasoning skills can be classified in level 4. Students' performance in mathematics needed to be more to attain levels 5 to 6, which indicates that they did not acquire the skills thereof, given that the educational curriculum in the Philippines was streamlined and guided by distinct student-centered learning approaches. Institutions across the country suffered from the same issue reported by PISA. Students are observed to have difficulty in reasoning skills when teachers ask them about the process and concepts being applied to the solutions or problems (Golla & Reyes, 2020). In response to this dilemma, schools nationwide implemented new strategies patterned from excelling countries to improve the current situation. One of the premiere private universities in the Davao Region, Philippines, has implemented the Claim-Evidence-Reasoning (CER) Approach to train students to use higher levels of mathematical reasoning. The CER Approach is taught in a scaffolded manner (Brunsell, 2012). It proposes that an explanation consists of a claim that responds to the question, support for the claim from student data, and reasoning based on a rule or scientific principle. Even with the innovative approach used by the institution, there are still concerns regarding the implementation of the approach. First, the school lacks data about the teachers' perceptions on implementing the CER approach. Second, locally, no formal study was conducted yet on implementing the CER Approach. Lastly, little was

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known about it being utilized in the Philippines context. It is in this regard that the researchers were motivated and interested in describing the lived experiences of the mathematics teachers on the implementation of the CER approach to address emergent concerns and for further improvement of the approach. Eventually, teachers will meet the needs of the present and the future for the common good, and the result may have implications for the school's educational setting or even go further.

## METHODS

### Research Design

This qualitative study used the descriptive phenomenological design. This design is one of the most commonly used methodologies in qualitative research that aims to explore and describe a phenomenon of interest (Shorey & Ng, 2022). This approach is suitable in the present study since the design is used to describe how human beings experience a particular phenomenon, in this case, the firsthand accounts of mathematics teachers' experiences using the CER approach to teach mathematics. The study focused on the challenges and issues the teachers have encountered in implementing the CER approach, how they coped with those challenges and issues, and insights worth sharing.

### Participants

The participants of this study were the 13 mathematics teachers of one of the premiere private universities in Davao Region, Philippines. Nine (9) participants participated in the in-depth interviews, and four (4) participants joined the focus group discussion. A purposive sampling technique was used in selecting the study participants based on the following inclusion criteria: (1) must be a mathematics teacher, and (2) must have implemented the CER approach in teaching mathematics. These study participants shared their struggles in implementing the CER approach, how they were able to cope with those challenges, and gave their insights about a part thereof.

### Instrument

The research instrument used in this study was a researcher-made semi-structured interview guide. The interview guide was composed of 10 open-ended questions that elicited the responses of the participants' lived experiences in utilizing the CER Approach, particularly on their challenges, coping mechanisms, and insights. Moreover, to establish the construct validity of the instrument, the interview guide was subjected to validation and evaluated by research content experts. The interview guide obtained a mean validity score of 4.50 which was interpreted as "excellent".

### Data Gathering Procedure

A letter of permission to conduct the study was submitted to the school principal. While awaiting approval, the researchers prepared and subjected the data-gathering

instrument to validation. Once the letter was approved and the research instrument was ready for use, the researchers proceeded to select the study participants based on the study's inclusion criteria. This was followed by a briefing and orientation to the participants regarding the study's objectives, confidentiality, and their willingness to participate. After the orientation, the researchers conducted in-depth interviews and a focus group discussion. The sharing during the interviews were recorded through a voice recorder and were then transcribed. Once the transcript was ready, the participants were provided with a copy of the transcript to check whether the transcript captured their ideas, and that the transcript represented their statements. The participants were given two (2) weeks to review the transcripts. After the transcripts were returned, the researchers continued the data analysis.

### Data Analysis

Thematic analysis was utilized to examine the data from the in-depth interviews and focus group discussion. Colaizzi's method (1978) served as a guide for analyzing the study's data. This method's seven separate-step processes offered a rigorous analysis, each of which maintained a close relationship with the data. According to Colaizzi (1978), the stages were familiarization, identification of significant statements, formulation of meanings, clustering of topics, creation of an extensive description, production of the fundamental structure, and seeking verification of the fundamental structure. The end product was a succinct yet comprehensive account of the phenomenon under study, supported by the people who contributed to its creation.

## RESULTS AND DISCUSSION

Based on careful analysis of the gathered data, four

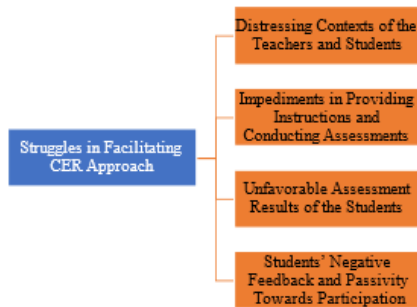


**Figure 1:** Lived Experiences of Mathematics Teachers in the Implementation of the Claim-Evidence-Reasoning (CER) Approach.

emerging themes were developed, namely: (1) Struggles in facilitating the CER Approach; (2) Adapting growth mindsets and employing support systems; (3) Milestones in the implementation of CER; and (4) Being open to continuous personal and professional development of the teachers. Figure 1 depicts the central themes with their corresponding sub-themes extracted from the participant's narratives.

**Theme 1: Struggles of the Teachers in Facilitating CER Approach**

Struggles of the teachers in facilitating CER Approach was the first identified theme that involved the teachers' encountered challenges in implementing the CER approach. Difficulties were often unavoidable but



**Figure 2:** Struggles of the Teachers in Facilitating CER Approach.

essential in learning (Lodge et al., 2018). The same for the teachers; nothing was easy at the beginning when a new approach was being implemented, such was the reason why there were struggles surfacing in different scopes: Distressing contexts of the teachers and students; Impediments in providing instructions and conducting assessments; Unfavorable assessment results of the students; and Students' negative feedback and passivity towards participation. Figure 2 illustrates the first major theme alongside its subthemes.

**Sub-theme 1: Distressing Contexts of the Teachers and Students**

The following narratives, which were described as follows, express the struggles of the participants on their own and in students' contexts with the use of the CER approach: "...The first part was the challenging one. Not only for students but also for teachers, everyone adjusted and learned the approach. We need to be equipped and knowledgeable with this approach to deliver and teach our students the way CER should be taught." – IDI006 According to Nimsky (2015), creating a strategy was challenging as trying something new, whether you were an individual, a team, or a large institution. They struggled to find the best path forward, even if they had clarity on what they wanted to do next. This was also true for the participants who implemented the new approach and experienced a hard time using it. Consequently, it was challenging for them and for the students too. Both had to adjust, learn, and equip themselves with the approach

since it was not the usual teaching-learning mathematics routine that they were used to. In addition, according to Schweingruber and Nielsen (2016), context shapes teaching and learning. Teachers work within contexts, and those contexts matter. Thus, teachers need to consider the students' context in implementing the CER approach. "...The challenge is when students don't have rigid training of the lesson. Students will find it more difficult to answer these types of questions if they don't have the minimum mathematical skills. There is a domino effect when they don't know how to deal with the problem at the beginning and it certainly affects their whole performance." – FGD003

Furthermore, students found it challenging to create the essential connections between the subject matter and higher-level mathematical concepts if the foundation of mathematics was not learned and the building blocks of mathematics were not developed (Wriston, 2015). The students need fundamental skills in mathematics to understand the problem, how to deal with it, how to solve it, and justify the process of solving the problem. All these contexts from the teachers and students challenged the participants in implementing the CER approach.

**Sub-theme 2: Impediments in Providing Instructions and Conducting Assessments**

The challenges that participants had when providing instructions and conducting assessments in using the CER approach were mentioned in the narratives as follows:

"...The way students answer the questions. They have difficulty understanding what is being asked. At the same time, they have difficulty explaining the procedures and the concepts they used in answering/ solving the problem. The students were used to answering mechanical questions without explaining the procedures/ steps." – IDI002

As cited in Model Teaching (2021), students cannot compose a perfect CER response on their first attempt. This was evident in the participants' responses that their students had difficulty answering the assessments using the CER approach since they were used to solving problems without further evidence and explanations to justify their answers.

"...Creating a contextualized word problem is like a "trial and error" method which affects the students' performance somehow and the reliability and validity of the assessments." – FGD004

Additionally, the participants have experienced struggles in conducting the instruction and assessment. This was brought on by significant changes that created problems within the institution. Many people believed that the confusion and turbulence surrounding a significant change in approach were typical (Nimsky, 2015). In order for the students to grasp the idea and familiarize themselves with the process of the CER, the teachers should check and ensure that the construction of the materials and assessments must be appropriate, discussed, and aligned with the necessary components of the curriculum. From the planning of instructional materials, conducting the lessons, formulating questions,

and checking the assessments, all these demand time and efforts of the participants towards properly implementing the CER approach to achieve the desired outcome for the department and the students.

**Sub-theme 3: Unfavorable Assessment Results of the Students**

The challenges that the participants experienced in the students’ assessment results on the implementation of the CER Approach were expressed by the following narratives stated as follows:

*“...The only challenge that I have so far is that sometimes there are students who will not take the summative assessments in the CER approach seriously. They will just write anything on their sheets as their answers even if it’s not the concepts or properties being used, and it showed that they answer it for submission purposes only.”* – IDI008

*“...The students’ ability to adapt to the CER approach. There are a number of students with difficulty justifying their answers/claims. Despite the formative assessments given and how the learning activities are planned and implemented to help the students adapt to the approach, still students tend to just memorize and copy what was given in the examples.”*– FGD001

The participants revealed that the students have difficulty answering their assessments using the CER approach, specifically reasoning and justifying parts. According to Erin (2022), students can easily develop a claim. This is similar to the study from Montana State University, as Traut (2017) stated that the students still had trouble with the reasoning portion. However, the use of the framework did help them become better at making claims and supporting them with evidence in conclusion writing. They struggle with the difference between evidence and reasoning—that is why many students left the reasoning out. Also, participants shared that the students tend not to take the assessments seriously and answer them for compliance only.

The students’ experiences were like the study of Mcneil (2021), which stated that the CER’s reasoning portion proved to be the most challenging. This was predicted because other writers have noticed that students struggle to use reasoning in their CER. Hence low scores of students’ assessment results despite the formative assessments were expected, and they experienced it hard to explain and justify their answers since they were used to memorization and arithmetic solving.

**Sub-theme 4: Students’ Negative Feedback and Passivity Towards Participation**

The following narratives, which are described as follows, express the challenges to students’ feedback and participation in using the CER approach:

*“...During the first year of implementation, we received some negative feedback from the students like “they find it hard”, “it’s time-consuming”, and “it is difficult to justify” and questions like “why do we have to do all these.”* – FGD001

*“...The challenge affects its implementation because students’ active participation and engagement are very crucial. Inactive participation*

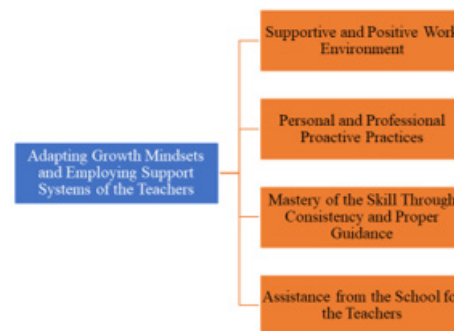
*of students was evident in test results. The majority of the students failed the quarterly assessments, especially during the first quarter.”* – FGD002

Djoub (2022) speculates that one of the reasons why students are reluctant to participate in class is because they have nothing to say. After giving a lesson explanation, teachers posed questions to gauge student comprehension and provide more explanation of the topics covered. They anticipated that students would react and offer crucial input. On the other hand, if they were still having trouble understanding that material, they would not take part in asking questions or participating in discussions. The CER approach created an interactive and engaging learning environment where teacher-student and student-student interactions happened. At this juncture, the participants revealed that the students’ passivity in the discussions, activities, and even in responding to their assessments was observed. The participants anticipated the students’ behavior since they noticed they were having trouble getting them to use the CER approach. Subsequently, the CER approach has received unfavorable criticism from the students as a result of their experiences.

Overall, identifying all these challenges that the participants have experienced will be able to tackle and address the concerns on implementing the CER approach in different identified areas of the curriculum. Also, pinpointing specific problems will lead to more straightforward resolutions. Making the appropriate decisions becomes more manageable once one can recognize problems and discover answers to them (Erica, 2020). It will not only address the struggles of mathematics teachers but also comprehend and address changes in order to get the intended results.

**Theme 2: Adapting Growth Mindsets and Employing Support Systems of the Teachers**

The second identified theme was adapting growth mindsets and employing support systems of the teachers. It encompassed the support and assistance from the



**Figure 3:** Adapting Growth Mindsets and Employing Support Systems of the Teachers

school and other ways to withstand the challenges in implementing the CER approach. According to the participants’ responses in the in-depth interview and focus group discussion, there were several strategies to handle the difficulties faced in the CER’s implementation. The participants remarkably shared the support they have

experienced in different aspects: Supportive and positive work environment, Personal and professional proactive practices, Mastery of the skill through consistency and proper guidance, and Assistance from the school for the teachers. Figure 3 shows the theme with its sub-themes..

### Sub-theme 1: Supportive and Positive Work Environment

The following narratives expressed the assistance and support that participants experienced:

*“...By seeking help and assistance from my fellow teachers in the math department, subject coordinator, and administrators. Also, I did my research on the CER approach.” – IDI004*

*“...Teachers still hone and enrich their skills by using the CER approach through Professional Learning Community (PLC) and with the guidance of our subject area coordinator.” – IDI004*

According to Dowd (2021), some examples of these shared fundamental values include respect, kindness, patience, and acceptance of one another. When positivity is the norm, workers volunteer their assistance before being requested. They work together to develop ideas, make big plans, and pursue excellence. In line with this statement, due to the established family-like relationship in the department, they were able to adapt and implement the approach despite the challenges by supporting each other and being open to communication.

Moreover, Dowd (2021) continued that positive work environments encourage direct and honest communication at all organizational levels, and open lines of communication clarify roles and expectations for jobs. Herrity (2023) also mentioned that a positive workplace culture encourages discussion. Employees felt free to give honest opinions about how the work should proceed and ask questions. The participants learn through their co-teachers and administrators by sharing what they know and their experiences, listening to inputs, continuously using these inputs for improvements, and generosity of their time to help support the participants. These contributions from their co-teachers served as the participants' source of comparison and enhancement for future implementation. During classroom visits, teachers can observe their colleagues teach and pick up tips they can use immediately in their lessons. These ways were how the support systems formed and helped the participants withstand the challenges encountered in implementing the CER approach.

### Sub-theme 2: Personal and Professional Proactive Practices

The following narratives, which were described as follows, expressed the experiences of the participants' assistance on personal and professional growth in using the CER approach:

*“...The willingness of every member of the school community to be helped and to help. All these, help me cope with the challenges in implementing the CER approach.” – FGD001*

*“...My openness to learn and adapt to the new approach helps in coping with the challenges.” – FGD004*

Aside from the support system that the participants

experienced together with their co-teachers and administrators to endure the difficulties in implementing the CER approach, they were able to do self-support as well. According to Xia et al. (2013), self-support was comprised of personal independence, initiative, responsibility, flexibility, and openness. The tendencies and abilities to deal with personal activity; carry out a task or action; act carefully and precisely; resolve personal life problems contingently; and accept new things and ideas.

As the participants shared in the interviews, for them to address some concerns that occurred in the implementation of the CER approach, they have done things such as research about the approach to append their knowledge and skills in using the CER, reached out to their colleagues, and conditioned themselves for more dialogues. The participants' patience, willingness, and openness to learn the CER encouraged and helped them in self-improvement. These acts of self-support were able to assist them in coping with the difficulties in the implementation of the CER approach.

### Sub-theme 3: Mastery of the Skill Through Consistency and Proper Guidance

Supports that the participants and students experienced in the mastery of the skill in the implementation of the CER approach were expressed by the following narratives stated as follows:

*“...A lot of repetitions and practices were given to the students regarding the CER approach.” – IDI002*

*“...More time for the practice of basic math skills. More drills to be able for students to clarify their concerns. Basically, more CER practices to make the students comfortable in answering such type of questions.” – FGD003*

Based on the study of Brophy (1986), drills and practices were required to build the essential levels of automatic and error-free performance in fundamental knowledge and abilities. It takes a lot of drills and practices to develop fundamental knowledge and abilities to the required levels of automatic and errorless performance. When done correctly, these exercises and routines seem equally crucial to sophisticated and imaginative intellectual functioning. The students have similar experiences in repeated drills and activities for mastery as the participants shared in the interviews. With their proper guidance in constant and consistent practice, they were able to cope with the students' struggles in implementing the CER approach in discussions and assessments.

Another way of aiding the challenges encountered by the participants in the implementation of the CER approach on the skills needed of the students to perform CER well in the discussions and assessments is consistency. When these drills and practices were properly conducted, they became a consistently effective teaching method (Edublox, 2020). Consequently, the participants shared the relevant materials with their students and provided enough time to answer the drills for mastery of skills and understanding of the approach.

#### Sub-theme 4: Assistance from the School for the Teachers

The following narratives, which were described as follows, express the assistance from the school for the teachers on the implementation of the CER approach:

“...Through In-Service Training for teachers and creation of the Professional Learning Community (PLC) among the teachers in the department.” – FGD001

“...The school allows the teachers to use the CER approach in the assessments with the guidance of the administrators. They also include the CER approach in the series of meetings for further understanding and discussions.” – IDI008

“...The school has full support of this approach which is evident in the use of this approach in summative assessments or quarterly assessments. There were also several faculty developments and efforts to intensify its implementation through meetings and discussions, and its inclusion in evaluation tool for classroom instruction.” – FGD002

Schools were starting to see the value of funding faculty development in today’s rapidly changing education landscape. The effects are felt widely when a university takes the initiative to provide teachers with chances for training and growth. The ability of instructors to adapt to new teaching techniques, construct and sustain consistent student experiences, develop institutional leaders, and enhance student outcomes are just a few of the noteworthy benefits (Malvik, 2020).

The participants mentioned that the school provided them with the support to cope with the struggles they have experienced in the implementation of the CER approach. The teachers were given various faculty development programs like training (In-Service Training), Professional Learning Community (PLC), and department meetings. Through these, the participants were able to converse, share their opinions regarding the implementation, and continue crucial discussions regarding the CER approach. Frequently, a support group provided a secure setting where the educators could obtain helpful, constructive, and beneficial knowledge. Through sharing their experiences, they gained support and discovered new ways to deal with their issues. It can also help people feel less alone in their struggles to hear from others going through similar experiences (Hoy, 2023). Although teachers already did an excellent job teaching their students, even the best teachers occasionally struggle to produce their best work. A robust support network can frequently reduce stress and boost confidence to accomplish more. When there is a strong supporting community, the participants have a group of people to whom they can turn for assistance with the problem. Indeed, adapting growth mindsets and employing support systems worked for mathematics teachers.

#### Theme 3: Teachers’ Milestones in the Implementation of CER Approach

Milestones in the implementation of the CER Approach was the third identified theme. It comprised the insights and thoughts of the participants on the implementation of the CER approach. Based on the responses of the

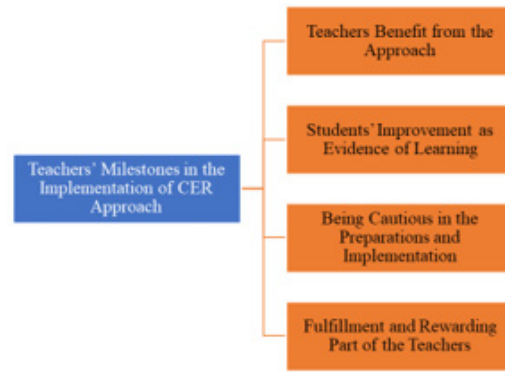


Figure 4: Teachers’ Milestones in the Implementation of CER Approach.

mathematics teachers, there were lessons learned that were worth sharing on the implementation of the CER. The participants astoundingly shared their insights and realizations on the following: Teachers Benefit from the Approach, Students’ Improvement as Evidence of Learning, Being Cautious in the Preparations and Implementation, and Fulfillment and Rewarding Part of the Teachers. The themes and their sub-themes are shown in figure 4.

#### Sub-theme 1: Teachers Benefit from the Approach

The benefits from the CER approach that the participants experienced were expressed by the following narratives stated as follows:

“...As a math teacher, it helps me assess if the students have a deep understanding of the concepts. It also develops my teaching skills in math. For students, it provides them to think and analyze more.” – FGD001

“...The teachers will have a deeper understanding as to who really among the students have a grasp on the topic. It diagnosed the skill and the lack thereof of the students. It makes teachers understand students’ level of learning better.” – FGD003

According to the World Bank Group (2021), successful teaching for teachers should include responding to the learning requirements of the students. According to the participants’ replies, the technique also served as a tool for them to gain a deeper understanding of the kids’ mathematical abilities, limitations, and learning processes. Moreover, students were able to answer problems and simultaneously understand the process and concepts used in solving the problem with the CER approach. The approach leveraged the conceptual understanding of the students in using the CER approach, the students manifested improvement and sensible responses. These responses were evident in their assessments. In light of the settings of the students in CER, this allowed teachers to adapt and enhance their math teaching abilities as well. The approach was beneficial for the teachers. Though it took a lot of work and explanation, eventually, it became a better method for the students. When students grow and benefit from the approach, the outcomes for the teachers are more beneficial since the desired results are eventually reached.

### Sub-theme 2: Students' Improvement as Evidence of Learning

The following narratives, which were described as follows, expressed the experiences of the participants in students' improvement as evidence of learning in using the CER approach:

*"...Given the new skill, consistency is the key. It may not be perfect, but it will surely pay off in the long run. Their outputs are much way better than not using CER. Their claims or answers are more cohesive, supported with evidences, concepts, and reasoning which will make them more critical and analytical problem solvers and thinkers."* – IDI009

*"...Because the scores of the students improved. Since the implementation of the CER approach. There is a noticeable improvement in the manner in which the students answer the problem. We can say that the analytical thinking skills of the students have improved."* – FGD004

As cited by Mcneill (2021), over time, the majority of students got better at writing their own CERs. This was similar to the participants' claims regarding the students' improvement. In the fullness of time, the results of the students' output were remarkably better-quality. The improvements were manifested in the students' outputs which were evidence of learning using the CER approach. *"...Allows students to think critically and apply what they've learned especially the skills they've acquired in real-world situations. Students do not stop by simply showing the step-by-step process but have to justify the pieces of evidence by stating reasons."* – IDI001

According to New York Science Teacher (2023), using CER in math classes was advantageous because it enables students to clearly explain their mathematical understanding and assess their classmates' arguments and supporting data. It also helped students develop the logical and critical thinking abilities crucial in mathematics. Additionally, it gave them a chance to connect various mathematical ideas and articulate their reasoning in a clear and orderly manner. The participants revealed the beneficial outcomes of the approach in students' growth, critical thinking skills, and mathematics literacy. Furthermore, they developed mathematical and analytical skills and how the students expressed and gave sound judgment on the given real-life problem situations—leading them in the direction of the schools' ideal graduates – Reflective Problem Solvers. Such was the reason as well why the participants were convinced to continue the usage of the CER approach in teaching Mathematics.

### Sub-theme 3: Being Cautious in the Preparation and Implementation

The following narratives expressed the experiences of the participants in being cautious in the preparation and implementation of the CER approach:

*"...My experiences are worth it, especially those questions that need to be chosen and constructed carefully."* – IDI005

*"...The construction and formulation of problems using CER helped me to organize the students' answers/claims in more*

*systematic ways. I'm able to check and understand their contexts the way they answer the assessments and identify where to help them and where to focus."* – IDI009

In the study of Saro et al. (2023), they emphasized that teachers are accountable for their students' performance. This emphasized that teachers should be cautious in the preparation and implementation of the CER Approach. The participants' struggles in conducting the assessments gave them an overview of the bigger picture of the implementation. Based on the discussion in National Academies Press (1993), regardless of the source or aim, instruction, and assessment must be linked such that they complement one another. Both students and teachers were able to improve student work in mathematics because of mathematics assessments. Students gained the ability to track and assess their progress. Students who were encouraged to evaluate their learning became more conscious of their prior knowledge, their learning style, and the tools they used to acquire mathematics. Thus, the preparations for making the assessments were cautiously planned and constructed by the participants. This became very important to them since assessments were one of the indicators of having excellent and quality teaching and learning mathematics.

Moreover, with the help of the school community that the participants received, they thoroughly managed the adjustments and reconstructions of the assessments aligning with the CER approach. Considering the contexts of the students and the practicality of the questions yielded more organized and systematic answers from the students. All of these made the participants more cautious when putting the CER approach into practice, which they believed was beneficial in planning and conducting the assessments.

### Sub-theme 4: Fulfillment and Rewarding Part of the Teachers

The fulfillment and the rewarding part that the participants experienced in the implementation of the CER approach were expressed by the following narratives stated as follows:

*"...To see my students slowly becoming analytical problem solvers is worth all the painstaking hard work and sacrifices on the part of us, teachers."* – FGD001

*"...The experience is very challenging but worth it. The first part of implementation is always the hard one. Teaching and providing the students with this new approach to connect their experiences and learned contents into something that is much more reflective is overwhelming and fulfilling."* – IDI009

According to Lisien (2021), balancing morals with education was the wisest course of action. True fulfillment comes from using one's education to have a long-lasting impact on the things that are most important to them—putting one's values first results in both personal and professional fulfillment. Indeed, the result of the interviews depicted the participants' value towards their job, institution, and students as they revealed that the CER approach had surprisingly made a remarkable



development in the students' learning and needed skills in mathematics. When students transcend their acquired fundamental skills in mathematics to analyze real-life problems critically and provide answers that came from extensive discernment conveys great impressions on teachers' experiences. This significant impact bequeathed a fulfilling role to the teachers and have seen the result of their labors despite the struggles they have experienced in the process. It gave the teachers overwhelming emotions in more positive ways and could vouch for their abilities to do their duties as mathematics teachers.

Teachers were often amazed at the tremendous joys of witnessing their students learn and progress. Nothing makes a teacher happier and prouder than seeing one of their students achieve and knowing that they have assisted in preparing them with the necessary skills. In this light, they developed more knowledge and a greater interest in the subject and discovered what arouses their passion the most over time. This significant stage in the teachers' process, development, career, and life will always be the fuel to ignite and continue their perseverance and passion for working with their hearts in bringing life to all the school's plans for the students. Indeed, the milestones for mathematics teachers in implementing the CER approach.

#### **Theme 4: Teachers' Being Open to Continuous Personal and Professional Development**

Being open to continuous personal and professional development was the final theme that emerged from the participants' responses. It included the suggestions made by the participants following their involvement in the CER approach's implementation. The mathematics teachers' responses indicated that there was still room for improvement in the CER approach. The recommendations that the participants suggested in ensuring relevance and further enhancement of the implementation of the CER approach were expressed by the following narratives stated as follows:

*"I will still recommend the implementation of the CER approach provided that questioning techniques and constructions be improved so as not to make the whole process more structured. We, the teachers need more training/workshops to improve our implementation of the approach."* – FGD004

According to the World Bank Group (2021), teachers need concrete guidance and support in four main areas: (1) re-engaging with students; (2) assessment, (3) curriculum and pedagogy, and (4) digital skills. Implementing the CER approach had a beneficial outcome for both students and teachers despite the struggles encountered. However, to better improve the approach, the participants recommended continuing the In-Service Training (INSET), workshops on questioning techniques, test constructions, and technology integration. It was further recommended that the Professional Learning Community (PLC) be utilized even more to discuss the relevance enhancement of the approach.

*"...The school may send teachers to seminars or workshops related*

*to the CER approach, continue the In-Service Training and PLC, and if possible, they will let the teachers visit schools that are using the CER approach."* – IDI001

*"...Provision for training/workshops for teachers shall be continued like In-Service training. The school might also consider having training/workshops outside the school for further exposure and experience of this approach."* – FGD001

According to Evardo & Abina (2023), being open to personal and professional development activities enhances teachers' capability in teaching. Nwaorgu and Nkedishu (2023) found that seminars, workshops, classroom/school visitation, mentorships, peer coaching, teachers' conventions, conferences and among some of the many in-service professional development activities teachers can participate. Meanwhile, according to Malvik (2020), the most effective faculty training included them in the creation and deployment. Early adoption of the faculty members who assisted in others' training increased engagement and helped students learn new skills. Since technology and educational opportunities change annually, counting on teachers to stay current with the newest trends and pedagogical approaches would be absurd. The institution must invest in the best training to equip staff to provide students with the most excellent education possible. Similarly, as the participants shared in the interviews, they were open and willing to be sent and exposed to outside school training and seminars.

Professional growth and ongoing learning were more crucial than ever for job success as the professional world got more competitive and underwent rapid change. Every industry saw an evolution of technologies and best practices, making it essential for new and seasoned employees to keep refining their knowledge and skills (Antley, 2020). As a result, in order to do their jobs effectively, teachers also require sufficient assistance, preparation, resources, and space (Dowd, 2021). Being open to changes in various training for ongoing personal and professional development was crucial for the teachers and schools in this generation who work to provide high-quality education and improve the school community's learning environment.

The implementation of the CER approach in teaching-learning mathematics took varied experiences for mathematics teachers. The approach was tough at first and gave the participants struggles in providing and conducting instruction and assessments, and created problems in optimizing students' participation. However, the adapting growth mindsets of the teachers and employing a support system from the school withstand and endure the difficulties experienced by the teachers in the process. Giving teachers appropriate training, department meetings, Professional Learning Community (PLC), and other faculty development programs helped them cope with the challenges and see the results of their efforts, perseverance, and uphill battles. The milestones of their implementation were truly appreciated, and they were open to continuous personal and professional developments for their further improvement and future endeavors.

## CONCLUSIONS AND RECOMMENDATIONS

Based on the results, hereunder were the conclusions drawn by the researchers: (1) Teachers' resiliency and adaptability in the process partnered with the school's support, helped the teachers overcome the problems that came up in implementing the CER Approach. (2) Conferences with trainers and colleagues are essential for further enhancement in the implementation of the CER approach. (3) Mathematics teachers view the CER approach as beneficial to the teachers and students in teaching-learning mathematics. (4) Mathematics teachers desire to expose them more to any relevant faculty development programs that will foster improvement in teaching-learning mathematics with the use of the CER approach.

Moreover, the following were recommended: (1) Mathematics teachers may continue using the CER approach in teaching-learning mathematics. (2) Mathematics teachers may continue to seek and engage in professional growth opportunities such as seminars/workshops, Professional Learning Community (PLC), and peer mentoring sessions. (3) Schools may continue to provide In-Service Training (INSET) for the teachers in the reconstruction of assessments, further Faculty Development Programs utilizing the CER approach, and dialogues in the school community. (4) Further studies on the teachers' lived experiences in the implementation of the CER Approach could be done in the other disciplines to reinforce and validate this study's findings, with the goal of gathering more information and insights from the other teachers. (5) Further experimental or quasi-experimental studies may be conducted to establish the effectiveness of the CER Approach.

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