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Teacher Perspectives on CAMI Implementation: Usability and Pedagogical Effectiveness for Grade 8 Linear Equation Word Problems

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Abstract: Computer-Aided Mathematics Instruction (CAMI) has gained popularity in the teaching and learning of mathematics in rural schools. Davis's Technology Acceptance Model (TAM) and Bandura's Observational Learning Theory (OLT) were utilised to underpin this study. The two theories complement each other, with TAM addressing teachers' perceptions, while OLT was necessary in this study to explain how these perceptions are formed. This study employed a qualitative research approach to explore teachers' perceptions of using CAMI to teach linear equation word problems (LEWP). Additionally, this research adopts an existential phenomenological design to investigate CAMI's usability and pedagogical effectiveness within the Grade 8 LEWP context. Data were collected through semi-structured interviews with Grade 8 teachers teaching LEWP. Thematic analysis was applied to the collected data, and the findings revealed that teachers who use CAMI to teach LEWP have both positive and negative perceptions. CAMI was found to be effective, as it assists teachers in teaching LEWP for conceptual understanding. However, the shortage of computers has limited many learners' participation in lessons, as one laptop is shared by ten or more learners. The study recommends that CAMI be implemented in rural schools to teach mathematics, as it can work offline, which makes it easily accessible. Finally, schools should provide learners with more computers.

Keywords: Mathematics instruction, teacher perceptions, teacher experiences, word problems, perceived usability, perceived usefulness.

1. Introduction

Computer-Assisted Mathematics Instruction (CAMI) is gaining popularity in the teaching and learning of mathematics, as it supplements conventional teaching in both developed and developing countries (Akcay, 2023; Amukpume & Idehen, 2024) and promotes interactive learning. Literature shows that many developed countries have introduced CAMI in mathematics education. In the United States, it was implemented between 1965 and 1989 (Baki & Gürsoy, 2020; Foster, 2024; Semerikov et al., 2021). It was also launched in China (Xie et al., 2020), as well as in Indonesia and Japan (Lavicza et al., 2022; Sunzuma, 2022; Tejera et al., 2022). In Africa, research regarding CAMI has been conducted in Nigeria (Atteh et al., 2023; Awofala & Uwajuwa, 2023; Effiong & Esuong, 2023; Ukaigwe & Goi-tanen, 2022) and Ghana (Lotey et al., 2023). In South Africa, studies on CAMI were conducted by Adelabu and Alex (2022), Adelabu et al. (2023), and Hardman and Lilley (2020). Therefore, this literature demonstrates that CAMI is both beneficial and user-friendly for educators and students.

CAMI is described as the instruction delivered through mathematical software to facilitate learning and teaching while promoting learners' interaction with the material (Adelabu et al., 2023). Foster et al. (2024) and Ran et al. (2021) view CAMI as software and web-based programmes that supplement conventional instruction and assist learners in applying mathematical concepts and skills. It is an

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instructional methodology that leverages multimedia software in a single or multi-learner setting (Aimukhambet et al., 2023). By interacting with a computer, learners engage in interesting and challenging activities (Tabuena & Pentang, 2021). Amukpume and Idehem (2024) describe CAMI as a software package that assists learners in interacting with learning materials with the support of their teacher. In this study, CAMI refers to computer software that encourages learner interaction, collaboration, and the sharing of mathematical ideas to solve problems, improving their mathematical knowledge and skills and enhancing their performance. Akcay (2023) maintains that CAMI not only enhances learners' performance but also develops their critical thinking and problem-solving skills.

The integration of CAMI in mathematics education has numerous advantages (Clements & Sarama, 2014; Foster, 2024; Orjika, 2018; Ukaigwe & Goi-tanen, 2022). For example, Ok et al. (2020) opine that CAMI heightens learners' motivation and interest, improves their understanding of the subject matter, and boosts their academic achievement. CAMI fosters a positive attitude towards mathematics and increases the efficiency of mathematics education and learner performance (Ozdemir et al., 2020). Other advantages of CAMI, according to relevant literature, include its ease of implementation, provision of a standardised scope and sequence, adjustment of instructions according to a learner's cognitive level, and the teaching of each fundamental skill to mastery level (Clements & Sarama, 2014; National Research Council, 2009). Foster (2024) asserts that CAMI assists in individualised instruction, closely monitors learner progress, and provides learners with access to worldwide information. The CAMI software contains all mathematical modules, as well as notes and exercises (Adelabu & Alex, 2022).

Bonsu et al. (2020) point out that CAMI enhances teaching and learning at all levels of mathematics education in Africa. Additionally, Baki and Gürsoy (2020) find that CAMI enhances learners' academic achievement, including that of average and underperforming learners. During the process, learners complete their tasks on computer screens and receive immediate feedback about their performance. Apart from boosting learners' academic scores, CAMI improves their retention of knowledge and classroom participation (Aimukhambet et al., 2023). According to Toluwa et al. (2021), CAMI not only enhances learner academic achievement but also supplements conventional teaching methods.

Literature on the subject also indicates some obstacles to integrating CAMI in mathematics education. These include, among other things, lack of funding, poor teacher training and motivation, inadequate technological infrastructure, insufficient technological support, and unstable power supply (Bonsu et al., 2020). Lim and Aryadoust (2022) voice their concern about the quality and reliability of computer technologies and the possibility of malfunctions or technical difficulties that may disrupt the learning process. On the other hand, Aimukhambet et al. (2023) worry that less social interaction and collaboration may impede the development of learners' interpersonal skills.

An examination of the literature in this field reveals that the experiences and perceptions of teachers using CAMI to teach Grade 8 linear equation word problems (LEWP) in rural secondary schools have never been studied. However, extensive research has been conducted on the effects of CAMI on mathematics education regarding learners' retention of knowledge and performance, as well as teachers' pedagogical approaches. The effects of integrating CAMI in the teaching and learning of mathematics to enhance learners' academic achievement have been investigated (Akcay, 2023; Amukpume & Idehen, 2024; Awufala & Uwajuwa, 2023; Baki & Gürsoy, 2020; Foster, 2024; Ukaigwe & Goi-Tanen, 2022; Semerikov et al., 2021). Some studies have also focused on CAMI's enhancement of mathematics teachers' pedagogical practices and content delivery (Adelabu & Alex, 2022; Effiong & Esuong, 2023; Lotey et al., 2023). Venketsamy and Hu (2022), Lotey et al. (2023), and Ozcan and Ates (2021) have investigated teachers' adoption and perceptions of CAMI in mathematics education, as well as their challenges.

In South Africa, CAMI was adopted in 1984 to supplement traditional methods of teaching mathematics (Waker, 1984). Since then, it has gained popularity, particularly in rural schools. CAMI also appears to be a popular research subject in South Africa. Adelabu and Alex (2022) investigated preservice teachers' perspectives on integrating CAMI to teach mathematics in higher education institutions, while Adelabu et al. (2023) explored first-year teacher education students' self-directed learning through CAMI. Venketsamy and Hu's study (2022) focused on foundation-phase teachers' experiences in integrating computer technologies to teach mathematics. In contrast, Mogashoa (2014) examined the challenges teachers face in integrating computer technologies into teaching mathematics. Alex (2018) assessed how CAMI enhanced the teaching and learning of mathematics.

Due to a concentration on learners' academic achievement challenges and the effects of CAMI on teachers' pedagogical practices, few studies have explored the experiences and perceptions of teachers who use CAMI to teach Grade 8 LEWP in rural schools. Accordingly, an existential, phenomenological research design will focus on the experiences and perceptions of teachers who implemented CAMI to teach Grade 8 LEWP in rural secondary schools. This study will address two research questions:

- What are Grade 8 teachers' perspectives on the usability and pedagogical effectiveness of CAMI in teaching linear equation word problems?
- What are the potential challenges that teachers encounter when implementing CAMI for LEWP instruction?

2. Theoretical Perspectives

The Technology Acceptance Model (TAM) theory by Davis (1986) and Observational Learning Theory (OLT) by Bandura (1969) underpin this study. The rationale for integrating these theories into a single study was to understand the experiences and perceptions of teachers regarding the perceived usefulness, ease of use, and negative perceptions of CAMI, as well as attention, retention, reproduction, and motivation within this model. While TAM focuses primarily on individual perceptions (usefulness and ease of use), it lacks explanations of how these perceptions are formed. This is where OLT contributes, emphasising learning through modelling, imitation, and social reinforcement. Together, these two theories will aid in understanding learners' reactions to CAMI from their teachers' perspectives.

2.1 TAM theory

TAM is a widely recognised theory regarding the acceptance, utilisation (Luo et al., 2024), and adoption of technology in the workplace (Mantello et al., 2023). According to Davis (1989), two crucial elements influence the acceptability, utilisation, and adoption of technology, namely perceived usefulness (PU) and perceived ease of use (PEU). The perceived usefulness and perceived ease of computer usage in teacher education offer several benefits for learners, particularly enhanced performance (Luo et al., 2024).

PU is defined as a person or organisation's belief that the system can facilitate work (Davis in Wicaksono & Maharama, 2020). It also refers to the extent to which individuals believe that employing a certain technology would improve their productivity (Luo et al., 2024). For example, Davis (1989) describes PU as the extent to which an older person believes that technology enhances their work and daily life performance. Additionally,Davis and Arbor (1989) assert that PU is the "degree to which a person believes that using a particular system would enhance his or her job performance" and is "capable of being used advantageously." Users must believe that a system is useful, requires minimal effort, and is easy to use (Dasgupta et al., 2002). In this context, PU can help researchers understand LEWP teachers' experiences and perceptions of CAMI, aiding in determining whether it facilitates learning. Therefore, teachers with positive perceptions of the integration of CAMI are likely to adopt it in their mathematics teaching and learning. Conversely, some teachers may hold negative perceptions, manifesting as responses and knowledge that do not support the perceived object and may oppose or reject it.

PEU, on the other hand, refers to the extent to which individuals believe that a certain technology is user-friendly and effortless (Luo et al., 2024). PEU represents the perceived ease of use or system interaction (Davis, 1989; Nezamdoust et al., 2022). People embrace PEU if they believe that using technology is effortless and reduces their workload (Alsyouf et al., 2023). Accordingly, Susanto and Aljoza (2015) identify several dimensions of PEU, such as ease of navigation, fast response, a clear and easy-to-understand display or interface, and accessibility anytime and anywhere. PEU influences one's attitude towards technology systems (Wicaksono & Maharani, 2020). This suggests that if teachers believe that the technology will reduce their effort in teaching LEWP, they will accept CAMI. However, if they find it challenging to use in teaching and learning, they will be reluctant to adopt it. Rohani and Yusof (2023) argue that if the use of technology is complex and difficult to understand, it will likely be rejected.

Behavioural intention (BI) is an individual or organisational intention or effort to achieve a desired goal that affects consumer behaviour (Godin & Kok, 1996). According to Ranadie and Sharif (2016), BI can be described as an intention to engage in certain activities that may eventually become habitual. In the context of technology use, BI is influenced by PU and PEU (Wicaksono & Maharani, 2020). This notion is supported by Doll and Torkzadeh (1998), who maintain that PEU and PU can affect the BI to use technology. TAM provides the theoretical framework to understand the factors influencing teachers' acceptance of CAMI technology in their mathematics instruction, specifically focusing on whether teachers find the system useful for their teaching objectives and easy to implement in their classroom practice. In the next section, observational learning theory will be discussed.

2.2 Observational learning theory

According to Observational Learning Theory (OLT), a novice observes an experienced individual modelling behaviour in a social setting (Bandura, 1968). It posits that people learn by observing and imitating the behaviour of others, emphasising the role of social interaction and cognitive processes in learning. Although it is commonly known that an observer primarily imitates a model (Nolen, 2025), Bandura affirms that an individual can also learn from behaviour without imitating it. OLT involves cognitive processes, as learners internalise and make sense of what they see, enabling them to reproduce the behaviour themselves (Horsburgh & Ippolito, 2018). This implies that a model demonstrates certain behaviour in the presence of a novice so that the latter may acquire new skills and knowledge. Similarly, mathematics teachers observed the facilitator in an OPTIMI Classroom Solution, who trained them in the use of CAMI. The teachers adopted and utilised the model to teach mathematics and understand their learners' responses to this approach. Bandura outlines four conditions for observational learning in any form of observing and modelling: attention, retention, reproduction, and motivation.

Attention—the first observational-learning condition—requires the observer to pay attention to the model displaying a behaviour in order to imitate it and learn from it. Additionally, Horsburgh and Ippolito (2018) claim that the intent of the observers is to watch the behaviour they want to reproduce. In this study, the teachers modelled CAMI to teach Grade 8 learners LEWP and enhance their performance, showing their learners how to use CAMI to solve LEWP by accessing different problems, finding the correct solutions, and reading their notes to better understand a topic. Gibson (2004) opines that learners pay attention to their role models because they believe that by doing so, they can learn skills and behaviours relevant to a particular context.

Retention—the second observational-learning condition—requires observers to remember the activities of the model they observed. This condition involves converting observations into symbolic representations that can be stored in memory, which is enhanced by mental rehearsal and coding strategies. In this study, after the teacher had modelled the use of CAMI, learners were given the chance to rehearse it and see if they remembered what they had learned. This way, learners internalised and retained the skills and knowledge they had acquired (Horsburgh & Ippolito, 2018).

Reproduction – the third condition – enables a learner to translate symbolic representations into action. This may present a problem if a learner is developmentally not ready to replicate an action (Horsburgh & Ippolito, 2018; Manik et al., 2022). Conversely, a ready learner possesses the ability to replicate a desired behaviour. Successful reproduction depends on having the physical and cognitive skills to replicate an action, which can gradually improve through practice. Horsburgh and Ippolito (2018) assert that learners enact and imitate the new skills and knowledge they observe. This implies that the experiences and perceptions of teachers determine whether or not the use of CAMI to teach LEWP enhances learner performance.

Motivation – the fourth condition – is the drive to perform the modelled skills and knowledge (Manik et al., 2022). Motivated learners are more likely to reproduce actions they believe will result in valued outcomes. Bandura (1969) argues that if learners are to learn from and reproduce the behaviours they observe in their role models, they need to be motivated. In other words, learners should have an interest in demonstrating the skills and knowledge they have acquired (Manik et al., 2022). Accordingly, reinforcement and punishment play a pivotal role in motivation. Positive reinforcement refers to an action that is rewarded or recommended to others. Punishment occurs when the imitated behaviour is negative and likely to offend others (Manik et al., 2022). In this study, if teachers and learners were motivated to use CAMI in LEWP, good performance would have been their reward. Conversely, if their perceptions were negative, they would not have learned more about CAMI. Additionally, OLT enabled teachers to observe colleagues using CAMI, witness learner performance, and form their perceptions through vicarious learning experiences. This addressed TAM's gaps in explaining perception formation.

3. Related Literature

Literature related to this study discusses the usefulness, usability, and shortcomings of CAMI in mathematics teaching.

3.1 Usefulness of CAMI in mathematics teaching

The literature discussed above has demonstrated the usefulness of CAMI in mathematics education. For example, the use of CAMI has been found to enhance learners' academic achievement (Akcay, 2023; Amukpume & Idehen, 2024; Awofala & Uwajuwe, 2023; Baki & Gürsoy, 2020; Foster, 2024; Ukaigwe & Gaitan, 2022). Amukpume and Idehen (2024) investigated secondary school learners' use of CAMI and compared the results of a group of learners who used CAMI in mathematics with those of a group who did not. These scholars found that learners who used CAMI in mathematics performed significantly better than their counterparts. Similar studies have shown that the use of CAMI produced positive results in learners' academic achievement in geometry (Baki & Gürsoy, 2020; Foster, 2024). Overall, the literature in this field indicates that CAMI is useful and enhances learners' academic achievement in mathematics.

According to relevant literature, CAMI not only improves learners' academic achievement but also allows them to interact with mathematical concepts virtually, making them more interesting and challenging (Pentang, 2021; Ran et al., 2021). According to Clements and Sarama (2014), CAMI provides a standardised scope and sequence of adaptive algorithms that adjust instruction according to each individual learner's progress, teaching each fundamental skill to a level of mastery.

A review of the literature also shows that the usefulness of CAMI enhances teachers' pedagogical practices in mathematics teaching (Bonsu et al., 2020). Accordingly, Aimukhambet et al. (2023) claim that CAMI complements conventional methods of teaching mathematics. Amukpume and Idehen (2024) contend that CAMI transforms the role of the teacher into that of a facilitator, fostering meaningful learning and improved academic achievement. Additionally, Adelabu and Alex (2022) and Batti (2019) find CAMI useful in motivating and encouraging learners through facilitation and in building new knowledge for future learning. These scholars further posit that CAMI improves teaching instruction and teachers' mathematical knowledge, while Suson and Eugenio (2020) assert that CAMI is more efficient than traditional methods of teaching mathematics. On the other hand, Adelabu et al. (2022) contend that CAMI does not enhance teachers' pedagogical practices but is useful for monitoring learners' learning, the time it takes them to learn, and their performance during this time. These scholars also submit that CAMI develops learners' self-directed and active learning, motivating them to learn and solve difficult mathematical problems; its process is discussed below.

3.2 Usability of CAMI in mathematics teaching

Based on earlier discussions, CAMI is a user-friendly electronic software that can be easily accessed either online or offline. A teacher or instructor inputs the programmed modules beforehand, and the desired skills and knowledge are conveyed in a convenient and approachable manner in the absence of the teacher. Effiong and Esuong (2023) maintain that because CAMI is conveniently planned, prepared, and presented, learners are able to actively participate in what they see on their computer screens. Azare (2019) postulates that both teachers and learners need to be conversant with Information and Communication Technology (ICT) to enhance the usability of CAMI in the teaching and learning of mathematics.

According to Awofala and Uwajuwa (2023), CAMI is effective, as it allows learners to interact with instructional methods, access instructional materials, and monitor their own learning. Additionally, the authors assert that learners can access extensive knowledge links and broaden their exposure to diverse people and perspectives. Lotey et al. (2023) opine that computer usage is helpful and effortless in the teaching and learning of mathematics. Furthermore, Adelabu and Alex (2022) point out that CAMI should be available for effective and efficient teaching and learning in mathematics in the future and assert that CAMI makes it easy to access mathematics modules, notes, and exercises. It is simple to navigate between levels, use the calculator, and access the speed note (Adelabu & Alex, 2022). Learners should be able to receive immediate feedback and see their level of performance after completing an exercise (Adelabu et al., 2023).

3.3 Potential drawbacks of CAMI

Some potential drawbacks of using CAMI in mathematics education are identified in scholarly literature (Aimukhambet et al., 2023; Bonsu et al., 2020; Foster, 2024; Wu et al., 2020). Foster (2024) notes several concerns raised by schools, including developmental appropriateness, implementation logistics, and alignment with curricular requirements, which can interfere with the school timetable. Bonsu et al. (2020) highlight challenges in using CAMI, such as a lack of funding, insufficient training and motivation of teachers, inadequate technological infrastructure, poor internet connectivity, an unstable power supply, and insufficient technological support. Aimukhambet et al. (2023) add that reduced social interaction and collaboration impede the development of learners' interpersonal skills.

Further drawbacks include concerns about the quality and reliability of educational content delivered through technological means, as well as the possibility that technological malfunctions or technical difficulties may disrupt the learning process (Lim & Aryadoust, 2022). Hardman and Lilley (2020) and Ackey (2023) point out that teachers are not sufficiently trained to use computers for teaching; additionally, management often fails to promote the use of technology, and technological resources and equipment are frequently inadequate, inappropriate, and outdated (Venketsamy & Hu, 2022). The study's research methodology is discussed in the next section.

4. Research Methods

The purpose of this study was to analyse teachers' experiences and perceptions of the use of CAMI and to understand how these influence teaching methods and practices using LEWP. An interpretive worldview was adopted to explore the experiences and perceptions of teachers integrating CAMI in the classroom. The teachers who participated in this study have been involved in the twinning project that incorporates CAMI since its inception in February 2024. According to Creswell and Creswell (2023), the interpretivist worldview views reality as a social construct that is best understood by analysing the perspectives of participants—in this case, teachers using CAMI.

This study employed a qualitative research approach to investigate teachers' perceptions of using CAMI to teach linear equation word problems (LEWP). An existential phenomenological design was adopted to examine CAMI's usability and pedagogical effectiveness within the Grade 8 LEWP context. Churchill (2022) posits that existential phenomenological research design focuses on participants' experience of the phenomenon under investigation. Consequently, this design progresses from a concrete description of the experiences of participants (who are seen as fellow researchers) to an interpretation of their experiences, rather than offering abstract statements devoid of understanding the participants' consciousness (Pandin & Yanto, 2023). In accordance with this design, data were collected in a natural setting, providing a detailed narrative that enabled an in-depth understanding of the participating teachers' experiences and perceptions of the use of CAMI in the classroom.

A total of six Grade 8 mathematics teachers participated in this study. They were part of the twinning project, integrating the CAMI model in their classrooms. Two teachers from three purposively sampled schools in the Limpopo Province of South Africa were invited to participate in this study. The researcher conducted semi-structured interviews with these participants. According to Ruslin et al. (2022), semi-structured interviews allow the researcher to collect in-depth information and evidence. Additionally, the researcher was guided by observational learning theory and the Technology Acceptance Model (TAM) to develop a semi-structured interview instrument.

The interview data were audio-recorded and transcribed for analysis. In qualitative research, researchers purposefully select participants and sites to understand the research problem and question(s) (Creswell & Creswell, 2023). According to Stratton (2024), purposive sampling is a process whereby a researcher selects participants based on their presence in a population of interest, as well as specific characteristics, experiences, or other criteria. The interviews were conducted twice at the three schools in August and September 2024, during participants' lunch breaks, which ensured that lessons were not disrupted. Each interview lasted 10 to 15 minutes, which was convenient for all, and prior to the interviews, the researcher made appointments with the teachers.

4.2 Methodological approach

The following section describes how the datasets were analysed using observational learning theory and TAM theory. Table 1 outlines the main tenets of the framework alongside the performance indicators. The key tenets of observational learning theory are attention, motivation, reproduction, and retention. In contrast, the main tenets of TAM theory include positive perceptions, represented by perceived ease of use and perceived usefulness, as well as negative perceptions.

Table 1: *Methodological approach*

Tenet	Definition	Performance indicators
Negative perception	A perception that does not support the perceived object and opposes and rejects it.	- Teachers mention the shortfalls of CAMI.

Perceived ease of use (usability)	The belief that a certain technological system is effortless and minimises work.	- Teachers indicate that CAMI can be used anytime and anywhere. - It is easy to navigate and access LEWP. - CAMI responds quickly.
Perceived usefulness	The belief that a technological system enhances productivity and daily life performance.	- Teachers comment that CAMI improves their practices in LEWP. - The use of CAMI improves learner performance.
Behavioural intention	The intention to do something that will soon become a habit.	- Teachers confirm that CAMI is frequently used to learn LEWP.
Attention	A learner pays attention to a model and models its behaviour by imitation and learning.	- Learners learn how to use CAMI and access learning materials. - Learners access different LEWPs through CAMI and correct solutions to get a better understanding of the topic.
Retention	A learner remembers the activities facilitated by the model.	- Teachers indicate that, thanks to CAMI, learners retain the knowledge and skills of LEWP .
Reproduction	Learners replicate the behaviour of a model to improve their practice.	- Teachers indicate that CAMI enhances learners' LEWP problem-solving skills. - CAMI enhances learner performance in LEWP.

4.1 Data analysis procedures

The recorded datasets were transcribed to organise and prepare them for analysis. Thematic analysis was performed to interpret the experiences and perceptions of teachers who integrated the CAMI model in their classrooms. Consequently, patterns and themes that emerged from the collected data were identified. The trustworthiness construct ensured rigour and quality (Lincoln & Guba, 1985). Participants checked that the transcriptions faithfully reflected their statements (this is called member checking).

After member checking, the transcriptions were captured in Microsoft Excel. The researcher repeatedly read the transcribed data to ensure familiarity and identify information relating to the research questions. According to Creswell and Creswell (2023), a researcher must re-read datasets to gain a general sense of the information and reflect on its overall meaning. This process aided the researcher in classifying and reducing data into themes. These themes were developed and compared with the generated datasets to ensure accuracy. The rationale for thematic data analysis was to summarise the raw datasets. Moreover, the data analysis helped the researcher make connections between the research questions and the findings obtained from the raw datasets.

The researcher ensured that links were both transparent (demonstrable to others) and defensible (justifiable, given the objectives of the study) (Makgakga, 2023). The trustworthiness of the data was assessed by comparing the findings with the literature and obtaining feedback from the participating teachers. In qualitative research, trustworthiness is the degree to which the findings accurately reflect the reality of participant experiences (Ahmed, 2024). The teachers were identified by means of codes: MT1, MT2, MT3, MT4, MT5, and MT6, where MT1 stood for Mathematics Teacher 1, and so on.

All participating teachers consented to take part in this study. A close rapport was established by explaining the purpose of the study. A twinning project ethical clearance certificate had to be obtained (ref: 2023/09/06/90197607/46/MA) for ethical compliance. The teachers were assured that pseudonyms would be used to protect their identities. They were informed that their participation was voluntary and that they had the right to withdraw from the study at any time without prejudice. The teachers were assured that the data would be used for no other purpose and would be encrypted to render it inaccessible to any other party.

5. Presentation of Findings

According to Aimukhambet et al. (2023), CAMI supplements conventional methods of teaching mathematics and enhances teachers' pedagogical practices. Amukpume and Idehen (2024) and Adelabu and Alex (2022) assert that CAMI transforms teachers into facilitators of learning. Consequently, learning becomes a meaningful experience, leading to improved performance among learners. Following the semi-structured interviews with the six teachers, the collected data were transcribed for analysis. Themes were developed after the researcher read the data repeatedly, resulting in the identification of two themes: The significance of CAMI in teaching LEWP and its shortfalls.

5.1 The significance of CAMI in teaching LEWP

The findings of this study not only revealed the significance of CAMI in teaching LEWP but also highlighted its usefulness and usability. The participating teachers attested to its usefulness by expressing their acceptance and support for the software. Furthermore, they noted that CAMI supplemented conventional teaching methods and facilitated learning. According to the teachers, CAMI enhanced learner performance as well as their own teaching practices and problem-solving abilities. Excerpt 1 below illustrates the participating teachers' perceptions of its usefulness in teaching LEWP. The teachers are quoted verbatim, and coding protects their identities.

Excerpt 1: *Teachers' views of CAMI's usefulness*

MT2	Using Cami is beneficial as we refrain from chalk and chalkboard; teaching becomes learner-centred instead of teacher-centred. Learners are now able to solve problems independently, get feedback immediately, and monitor their feedback. Their performance also showed improvement in linear-equation word problems, as most of them started to take ownership of their learning.
MT4	The use of CAMI appears to make teaching and learning fun and interesting. I found myself facilitating learning rather than just using normal teaching. It has improved learners' performance in linear-equation word problems. Learning has changed from teacher-centred to learner-centred because learners are able to solve different problems and get feedback from the system. Learners can also know about their performance after solving problems from CAMI. Their problem-solving abilities appear to have improved after using this software.
MT5	CAMI is a very important tool and makes learning fun and effective. Learners are able to solve problems online and get feedback. Learners' participation has been improved since we used CAMI in teaching LEWP. This software also complements our traditional methods we used to teach and learning is then facilitated. The use of CAMI makes teaching and learning fun and interesting when teaching linear-equation word problems, and the progress of learners can also be monitored.
MT6	In rural areas, our learners do not have opportunities to use ICT tools such as CAMI, which has changed my teaching style to facilitation of learning. Learning is now learner-centred as most of the learners have taken ownership of their own learning. CAMI is found to be making learning interesting and fun. We can monitor the progress of the learners in CAMI and also monitor their performance online. Learners' performance is also improved in learning this topic, even the slow learners participated and improved in performance.

The participants' responses reveal that CAMI was useful and more effective than the chalk-and-chalkboard method, which impedes learning and does not cater to all learning styles. Their comments clearly indicate that CAMI made learning fun and interesting, allowing them to monitor learners' progress and performance online. Furthermore, the participants noted that CAMI replaced their conventional teaching methods, which facilitated learning and improved learner performance.

The participants emphasised the usability (ease of use) of CAMI in teaching and learning LEWP, as it was easy to access and operate. They felt confident using CAMI to teach LEWP and believed that employing it was effortless. Excerpt 2 below represents their opinions about the usability of CAMI in teaching and learning LEWP.

Excerpt 2: *Teachers' opinions about the usability of CAMI*

MT1	CAMI is easily accessible to all learners, as they can access it offline. No internet is required and learners are able to access instructional materials, notes and do exercises online and get feedback immediately. Learners can easily access their performance online, and even we teachers can access their performance on linear-equation word problems, and other mathematical topics. It is easy because learners can still go back to refer while busy with other concepts.
MT2	Learners are able to access the system and get exercises to solve and notes to use to make more meaning of linear-equation word problems. Learners solve problems and get feedback immediately on the system, and as teachers, we also monitor their progress and performance, print notes from the system, and share them with the learners. Our learners can move across contents of mathematics, they can still refer back to what they did and practiced before.
MT4	CAMI is easy for learners to use and access instructional materials, exercises and notes. Learners are able to access the exercises and solve them. After solving their exercises, learners then get immediate feedback on CAMI. CAMI is flexible, as learners can go back and forth while learning new materials. Other mathematics topics are also accessible easily, and access to notes is provided, which are printed and shared among the learners.
MT5	CAMI is a flexible software that one can use offline. Learners can access learning materials such as notes and exercises to solve. Learners are also able to easily access the feedback on their exercises and can monitor their feedback online. The teachers are able to access the system to monitor the learners' progress and their feedback of the exercises. We can also access notes on different topics, print and share with the learners. And learners can move forward and backwards while learning linear-equation word problems.

All participants agreed that CAMI was usable (ease of use). They found it easy to access and use, and remarked that learning materials, such as notes and exercises, were readily available to learners. Additionally, it was believed that the accessibility of learners' performance made it easy to track their progress. The findings also indicated that learners had no difficulty using CAMI, and they could navigate between levels while learning LEWP.

5.2 Potential shortfalls of CAMI

The findings also revealed some negative perceptions (or indirect disadvantages) of using CAMI in teaching LEWP. The participants identified a scarcity of laptops, insufficient funding, inadequate technological infrastructure, and infrequent learner-learner interaction and collaboration. They also expressed concerns about having little time to use CAMI, as they had to adhere to annual teaching plans. Excerpt 3 presents the participants' negative perceptions of CAMI.

Excerpt 3: *Teachers' views of CAMI's shortfalls*

MT2	With CAMI, we have insufficient funding of laptops as one laptop is shared by more than ten learners. Most of the learners do not have that opportunity to practise on the laptop because we have very few of them to accommodate many learners at the same time. The other issue is the problem of the computer laboratory to store laptops and for learners to use them.
MT3	The problem with CAMI is time because we want to finish the annual teaching plan. A shortage of laptops is a challenge, as many learners have to share one laptop. Learners could not work in groups because the system channelled them to work individually. We also have a problem of infrastructure, so we don't have a space to store our laptops. We always take them home because they may get stolen.
MT4	The issue of a shortage of laptops in our school is a challenge as many learners share one laptop, and they mostly like working on the laptop. Learners do not have a chance to share knowledge as the exercises must be completed by one learner at a time, so they cannot work in groups.
MT5	The main issue here is the shortage of laptops in our school, as the ratio of learners to laptops is high. The learners have less time to spend on the laptop as they need to give each other a chance to solve problems online. The other challenge with us to use CAMI is time, as we are expected to finish our annual teaching plans.

Based on the quotes above, it is evident that insufficient funding to purchase more laptops and the lack of storage for these laptops are obstacles to the use of CAMI. Furthermore, the participants highlighted that the time spent on CAMI affected their ability to adhere to their annual teaching plans. The quotes also illustrate the issue of learner interaction, as one laptop is assigned to each learner. It is clear that spending time on CAMI disrupted their compliance with their annual teaching plans.

6. Discussion of Findings

This study revealed that teachers embraced CAMI as a complement to their traditional teaching methods and found the software both useful and user-friendly for enhancing instruction (Luo et al., 2024). The findings showed that learners engaged with notes and exercises, resulting in changes to teachers' LEWP teaching methods, better progress monitoring for both themselves and their students, and enhanced overall performance. Their perceptions are supported by Aimukhambet et al. (2023), who maintain that CAMI supplements conventional methods of teaching mathematics. Amukpume and Idehen (2024) add that CAMI can change the role of the teacher from that of a mere instructor to that of a facilitator, which makes learning meaningful and improves learners' academic achievement.

The findings further revealed that CAMI taught mathematics more efficiently than conventional teaching methods. This aligns with the work of Suson and Eugenio (2020), who postulate that the usefulness of CAMI is superior to that of traditional mathematics teaching methods and can improve teachers' productivity (Luo et al., 2024). The participants also agreed that CAMI was useful as it assists in monitoring the progress learners make in mastering LEWP and in evaluating their performance. Adelabu et al. (2022) concur that CAMI is effective in monitoring mathematics learners' progress and in evaluating their performance virtually.

The findings confirm the usability (ease of use) of CAMI to teach LEWP, as teachers believed that this software is user-friendly and minimises workload (Luo et al., 2024). The teachers found that CAMI was easy to navigate, had a fast response, and presented information in a clear and understandable manner. This finding is supported by Effiong and Esuong (2023), who contend that CAMI can be accessed easily offline, as the instructor would have already input the programmed materials. Even in the absence of their teachers, learners acquired skills and knowledge in a convenient and approachable manner. The findings showed that teachers observed colleagues using CAMI, witnessed learner performance, and formed their perceptions through vicarious learning experiences. Nolen's (2025) study supports this view, demonstrating that people learn by observing and imitating others, which underscores the significance of social interaction and cognitive processes in learning.

Furthermore, the participants agreed that the use of CAMI was effortless and beneficial in teaching and learning LEWP. This stance is corroborated by Lotey et al. (2023), who contend that incorporating computers into mathematics education enhances both teaching effectiveness and learning accessibility. The findings also reveal that CAMI allowed learners to easily access instructional materials, such as exercises and notes, facilitating their understanding of LEWP. In addition, the participants concurred that CAMI enabled them and their learners to monitor progress and performance. Adelabu and Alex (2022) similarly concluded that CAMI facilitates easy access to mathematics modules, exercises, and notes. Furthermore, the participants were unanimous in stating that learners could navigate back and forth through CAMI. This aligns with the findings of Adelabu and Alex (2022) and Adelabu et al. (2023), which indicate that CAMI should be flexible so that learners can switch between levels, receive immediate feedback, and review their performance in any exercise.

While participants acknowledged that CAMI was useful and usable, they also expressed negative perceptions that made teachers hesitant to adopt it. According to Rohani and Yusof (2023), technology that is complex and difficult to understand is likely to be rejected by users, supporting this conclusion. The software's performance is hindered by insufficient laptops, poor infrastructure, and limited funding for additional hardware. These concerns are echoed by Bonsu et al. (2020), who found that schools had issues with the use of CAMI, including a lack of funding, inadequate technological infrastructure, and insufficient technological support. Another shortcoming highlighted by participants was the lack of learner-learner interactions, which impeded the sharing of knowledge about the programmed materials installed in CAMI. These findings align with those of Aimukhambet et al. (2023), who argue that reduced social interaction and collaboration hinder the development of learners' interpersonal skills.

7. Conclusion

This study explored mathematics teachers' experiences and perceptions of the usefulness and usability of CAMI to teach LEWP. The participants had both positive and negative perceptions of CAMI, as outlined in the previous section. The former involves the usefulness and usability of CAMI, while the latter pertains to potential obstacles to its use.

First, this study demonstrated that the participants supported and accepted CAMI for teaching LEWP, as this software is both useful and usable. The participants found the system's teaching approach more effective than traditional methods. They expressed satisfaction with the use of CAMI, as it transformed them into facilitators of learning and placed learners at the centre of the educational process. Additionally, the teachers could monitor the progress and performance of the learners, thanks to CAMI. Second, the usability of CAMI included easy access to programmed instructional materials, such as notes and exercises. Furthermore, learners could easily receive immediate feedback on their academic performance. The usability of CAMI is sustainable, provided that more learners have access to laptops. Lastly, potential obstacles included limited time to practise mathematical problems, a scarcity of laptops, a lack of technological infrastructure, and limited social interaction, which may impede learners' interpersonal skills, as well as a lack of technological support. These obstacles hindered CAMI's efficiency and effectiveness. Similarly, the ratio of learners to laptops demotivated students. If these potential hindrances are not addressed, especially the lack of funding to enhance the efficiency and effectiveness of CAMI, learner performance will undoubtedly be affected. Although laptops are scarce, learners should make time to enhance their mathematical knowledge, skills, and problem-solving abilities by using CAMI.

7.1 Limitations and recommendations

The study was limited to the experiences and perceptions of six mathematics teachers and excluded the perspectives of mathematics learners and the challenges they faced with CAMI. The findings are not generalisable to the entire rural-school population, as CAMI was implemented in only three schools within the circuit. Further research could involve multi-year studies tracking student performance outcomes when CAMI is consistently used compared to traditional methods. Additionally, researchers could investigate which specific training components most effectively prepare teachers to transition from traditional instruction to facilitating a CAMI-based learning environment.

9. Declarations

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