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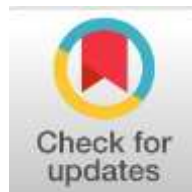
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Contextual Mind Mapping Facilitates Reading Comprehension For Deaf Elementary Students: Pemetaan Pikiran Kontekstual Memfasilitasi Pemahaman Membaca Bagi Siswa Tunarungu Sekolah Dasar

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Abstract

General Background Literacy acquisition constitutes an essential foundation for academic success across all educational subjects. **Specific Background** Fifth-grade learners with hearing impairments frequently struggle to understand narrative texts due to conventional instruction and an absence of visual learning media. **Knowledge Gap** Although visual graphic organizers and real-life pedagogical approaches have been extensively studied separately, their combined application to accommodate marginalized learners in inclusive classrooms remains severely underexplored. **Aims** This Classroom Action Research evaluates the implementation of Contextual Teaching and Learning (CTL)-based visual media to support the narrative text processing of a hearing-impaired fifth-grader alongside their peers. **Results** Following two instructional cycles, the focal participant's academic score progressed from a 45 baseline to 60 in Cycle I, ultimately achieving 80 in Cycle II, thereby surpassing the minimum mastery criterion. Concurrently, learner engagement escalated as individuals actively constructed visual nodes, identified main ideas, and connected written content to real-life experiences. **Novelty** This study uniquely integrates a visual graphic organizer with contextual learning principles specifically tailored to address the cognitive and communication characteristics of special educational needs learners within an inclusive setting. **Implications** Educators must adopt visually rich, contextualized instructional strategies to reduce cognitive load and facilitate meaningful literacy acquisition for individuals facing auditory constraints.

Highlights

- The integration of a visual graphic organizer with real-life connections significantly elevated learner engagement during narrative text lessons.
- The focal participant's academic score progressed from a failing 45 to an 80, surpassing the minimum mastery threshold.
- Reducing textual information into structured visual nodes minimized cognitive load for individuals with special educational needs.

Keywords

Reading Comprehension; Hearing Impairment; Mind Mapping; Contextual Teaching; Inclusive Education

INTRODUCTION

Reading comprehension is an essential literacy skill that enables students to gain, comprehend, and use information from written sources. Elementary school reading comprehension is the foundation for learning in all subject areas, as it helps students to identify main ideas, make inferences, and build meaning from written information. Good reading comprehension is not just the ability to identify words, but the ability to combine background knowledge with the information in the text to develop a deeper understanding of the content. Thus, one of the main objectives in basic education is to improve reading comprehension, including for students with special educational needs (Frans et al., 2023; Riyanti, 2021). Because of limitations in auditory language acquisition and vocabulary development, students with hearing impairments often have greater difficulty developing reading comprehension than their hearing peers. Understanding of grammar, range of vocabulary and the capacity to understand abstract information presented in texts is often affected by limited access to spoken language. For this reason, these students are highly dependent on visual information in learning activities. Therefore, educational practices highlight the importance of providing visual, concrete, and meaningful learning experiences that are in line with their cognitive and communication characteristics (Azis, 2023; Aisyah, 2022; Nofiaturrehman, 2018). Instruction dependent mainly on verbal explanations or conventional textbooks may not adequately support the development of reading comprehension skills in students with hearing impairment.

Based on the observations that have been done at SD Negeri 008 Muara Bengkal, it was found that the fifth grade student with hearing impairment had quite a lot of difficulty in understanding narrative texts. The student could not independently identify main ideas, respond to comprehension questions and summarize reading passages. Teaching was mainly done using black-and-white textbooks with little visual support. The involvement and participation in the reading activities were low. The student often did not want to read the task, required ongoing assistance from the teacher and received an average score of reading comprehension of around 40, well below the school's Minimum Mastery Criterion (MMC) of 70. The classroom teacher had used a number of instructional strategies such as individual assistance, collaborative learning, and the use of a variety of learning resources but these had not resulted in significant gains in reading comprehension. The results of this study indicate the need for a more flexible teaching method that creates visual learning media with meaningful learning experiences.

One instructional medium that holds great promise for addressing these challenges is mind mapping. Mind mapping is a visual representation of concepts by using keywords, images, symbols, colors and connecting branches which enable the learners to understand the relationship between ideas more effectively. This visualization reduces cognitive load and supports students to organize information systematically. Previous studies have shown that mind mapping can improve students' reading comprehension by helping them organize concepts, enhance memory retention and foster meaningful learning (Azizah, 2020; Karimah et al., 2024). Lukluk and Karsono (2019) also stated that mind mapping was effective in improving students' reading comprehension in elementary school because it helped students find the main ideas and make connections between ideas in texts. Mind mapping is more effective when combined with Contextual Teaching and Learning (CTL). CTL promotes students' ability to create knowledge by relating academic content to real situations experienced in their daily life. Students are not passive recipient of information, but are actively involved in the learning process through components such as constructivism, inquiry, questioning, learning community, modeling, reflection and authentic assessment (Nababan & Sipayung, 2023; Mulia et al., 2023). Meaningful experiences are provided to students with hearing impairment through contextual learning by linking visual representations with familiar real-life contexts. It helps them to understand written texts better. Moreover, previous research by Ilmi et al. (2024) found that the CTL method significantly enhanced the reading comprehension and classroom engagement of elementary students.

Despite the existence of numerous studies that have examined mind mapping or Contextual Teaching and Learning separately, very few studies have combined them to improve the reading comprehension of students with hearing impairment. Whereas previous studies have mainly focused on typically developing learners, empirical evidence involving students with hearing impairment in inclusive elementary classrooms is still limited. This study bridges the research gap by applying the CTL-based mind mapping media to facilitate reading comprehension of a fifth-grade student with hearing impairment in an inclusive educational environment. The novelty of this research is the combination of a visual learning medium with a contextual pedagogical approach specifically designed to accommodate the learning characteristics of students with hearing impairment while at the same time promoting collaborative learning with their hearing peers. Therefore, this research is intended to improve the reading comprehension learning process and the reading comprehension skills of students with hearing impairment through the use of CTL-based mind mapping media.

METHOD

This research applied Classroom Action Research (CAR) by the model of Kemmis and McTaggart. The research was conducted in two cycles, in each cycle consisting of four stages, namely planning, action, observation and reflection. This research was conducted at SD Negeri 008 Muara Bengkal, Kutai Timur Regency, East Kalimantan Province in the second semester of the 2025/2026 academic year. Each learning session was 2 × 35 minutes. The aim of the action research is to enhance the reading comprehension learning process and reading comprehension achievement of a student with hearing impairment through mind mapping media based on Contextual Teaching and Learning (CTL). The participants consisted of 14 fifth-grade students, 13 students without special educational needs and 1 student with hearing impairment. The main subject was a 12-year-old male student with hearing loss of 65 dB. The student struggled with identifying main ideas, understanding lengthy paragraphs, connecting ideas across sentences, and making inferences from narrative texts. His first reading comprehension score was about 40, below the school's Minimum Mastery Criterion of 70. The other students engaged in collaborative classroom activities to facilitate the implementation of the learning community component of CTL.

The intervention was done by integrating mind mapping media with the seven main components of CTL namely constructivism, inquiry, questioning, learning community, modeling, reflection and authentic assessment. The students were divided into four groups and given narrative texts related to real-life contexts in the learning activities. They identified the main ideas, chose keywords, made branches, added symbols or pictures and linked related concepts in their mind. The teacher provided visual cues, demonstrations, and scaffolded guidance, especially for the student with hearing impairment, but permitted students to choose the colors, images, symbols, and organizational patterns of their mind maps. At the end of each cycle, the teacher and collaborator evaluated the learning process and used the data to improve the next cycle. The data collection was carried out by reading comprehension tests, classroom observation and documentation. The reading comprehension test was made up of 20 multiple-choice questions, designed in accordance with the cognitive levels of C1 to C4.

The test measured students' skills in recognizing characters and settings, identifying main ideas, understanding cause-and-effect relationships, relating information from text to real life, analyzing relationships between events, and making inferences from narrative texts. The implementation of the CTL-based mind mapping activities was assessed with observation sheets on teacher performance and student participation. The documentation contains photographs of classroom activities, students' mind mapping results, lesson plans, teaching materials, observation notes and test results. Data analysis was performed through quantitative and qualitative descriptive approaches. Quantitative analysis was performed by calculating the individual test scores, the percentage of class mastery, and the average learning outcomes in the pre-cycle stage, Cycle I and Cycle II. Changes in teacher activities, student engagement, collaboration, independence and participation in the learning process were analysed using qualitative analysis. The action was successful when the student with hearing impairment reached at least 70 in reading comprehension, the average of the class reached at least 70, and the student participation based on observation results improved to the good or very good category. The effectiveness of CTL-based mind mapping media in improving reading comprehension was determined by comparing the test scores and observation findings between cycles.

RESULT AND DISCUSSION

Initial Condition (Pre-Cycle)

This classroom action research was conducted at SD Negeri 008 Muara Bengkal, Kutai Timur Regency, East Kalimantan, in the second semester of the 2025/2026 academic year. The intervention involved 14 students of the fifth grade, nine girls and five boys. The main research subject is a student with hearing impairment. The classroom teacher served as an observer along with the researcher throughout the study, and the school principal approved the implementation of the research. The study involved two action cycles, each with planning, implementation, observation and reflection. The effectiveness of the intervention was assessed through reading comprehension tests and observations in the classroom. Before the intervention, a preliminary observation and pre-test were conducted to know the students' initial reading comprehension ability and to find the learning difficulties in narrative text lessons. The pre-test consisted of 20 multiple-choice questions ranging from cognitive level C1 (remembering) to C4 (analyzing). The assessment measured students' ability to identify characters, determine settings, recognize main ideas, understand cause-and-effect relationships, apply information presented in the text, and analyze narrative passages. The results gave the baseline data for evaluating the effectiveness of CTL-based mind mapping intervention. The initial results showed that there are some students who have problems in understanding narrative texts, with the highest difficulty of the student with hearing impairment. In the assessment, the student took a lot longer to complete the test and often re-read the passages and had difficulty in identifying main ideas and locating important information from the text. In addition, the student relied heavily on teacher guidance to answer comprehension questions, indicating limited independent reading comprehension skills. As shown in Table 15, the student with hearing impairment had a pre-test score of 45, which was categorized as very poor and did not meet the Minimum Mastery Criterion (MMC) of 70 set by the school. The result showed that the student had difficulties to comprehend the narrative text before the intervention. The low achievement further reinforced the need for an instructional strategy specifically designed to address the student's visual learning characteristics and communication needs.

The results at the classroom level showed a similar pattern. Table 16 shows that only four students (28%) out of 14 students who met the minimum mastery criterion while 10 students (71%) were below the standard required. The average score of the class was 59, which means that the general reading comprehension achievement of the class was still below the expected level. These results suggest that reading comprehension was a problem not only for the student with hearing impairment but also for some hearing students in the classroom. The classroom observations also showed that the prevailing instructional practices relied largely on textbooks and teacher explanations with minimal visual learning support. The teacher had previously used mind mapping in other subjects but the strategy had not been systematically used in reading comprehension instruction. As a result, students were more likely to memorize information than interpret the texts. Specifically, the student with a hearing impairment struggled with organizing ideas, identifying relationships among concepts, and summarizing narrative passages due to insufficient visual scaffolding in the learning activities. The baseline findings thus emphasized the need to carry out more adaptive instructional approach through the combination of visual learning media and meaningful learning experiences. The reason for selecting the CTL-based mind mapping was that it encourages students to visually organize textual information and relate new knowledge to real life experiences. This combination was expected to allow for deeper understanding, more student engagement, and more learning support for the student with hearing impairment in the inclusive classroom. In general, the pre-intervention findings verified that the students' reading comprehension skills were still poor, and their learning needs were not met by the traditional instructional practices. The baseline data were used as the basis for the implementation of Cycle I where CTL-based mind mapping was introduced as an intervention to enhance the reading comprehension process and learning outcomes of the student with

hearing impairment and the overall classroom performance.

Cycle I

Cycle I was conducted in 2 x 35 minutes (2 x 35 minutes) session. Cycle I was used CTL-based mind mapping to develop comprehension of narrative text. Before implementation, the researcher prepared lesson plans, CTL-based mind mapping media, reading material, student worksheets, observation sheets, and assessment instruments. The narrative texts were taken from the Grade V Indonesian language book based on the Merdeka Curriculum. Also, discussions were held with the classroom teacher, who played the role of observer, to ensure that the learning procedures, observation strategies and assessment criteria were implemented in a consistent way across the intervention. The first meeting was about the introduction of the CTL-based mind mapping for the students and making them aware of the learning procedures. The lesson started with a constructivist activity where the teacher related the topic of the narrative text to students' daily experience by discussing environmental conditions around their village. The teacher then showed how to turn a long paragraph into key words, how to shape the main topic and how to develop supporting branches using a mind map. Students worked together in four heterogeneous groups to analyze a narrative text entitled Love the Earth. Students used inquiry activities to determine the main topic, supporting ideas and new vocabulary, then compiled the information into visual mind maps. In the lesson the teacher requested questions, guided group discussions and helped students to connect the content of the text with real life situations. Finally, at the end of the lesson, each group presented its mind map and reflected about the learning experience, and the teacher provided authentic feedback about the organization and content of the completed maps.

A reflection was made after the first meeting and some weaknesses that had to be improved were identified. While the students were enthusiastic about the visual learning activities, the mind maps that many groups created were not well organized and did not contain complete information. Some students were more interested in drawing and coloring, rather than identifying the important ideas in the narrative text. The hearing impaired student also needed further assistance to connect the textual information to meaningful real life experiences. The results showed that the students required more structured guidance before they could produce the final version of their mind maps. On the basis of these considerations several changes were made at the second meeting. Students were first asked to draft their mind maps in their notebooks and then transfer the final version to larger paper. This strategy encouraged students to refer to the text more frequently, organize ideas more systematically and create clearer visual representations. The teacher also did additional demonstrations with a projector, showing how to find keywords, how to arrange supporting branches, and how to relate the story's content to real-life situations. Furthermore, group members were assigned varied roles such as group leader, recorder, illustrator, and presenter to encourage collaboration and make sure each student was involved in the learning process.

In the second meeting, students were more confident and collaborative than in the first session. The hearing-impaired student was more active in group discussions, helped to identify keywords, and filled out the assigned parts of the mind map with the help of colleagues. Most of the groups developed more structured and meaningful mind maps by connecting the narrative text to their own experiences. Classroom observations also showed improved student engagement, communication and participation throughout the CTL learning stages. However, some students, including the student with hearing impairment, still found it difficult to draw conclusions independently from the narrative text. Thus, the need for further refinement of instructional strategies was considered necessary and served as the basis for planning the interventions implemented in Cycle II.

Table 1. Reading Comprehension Test Results of Grade V Students in Cycle I Following the Implementation of CTL-Based Mind Mapping Media

Reading Comprehension Test Results	Cycle I
Result	Frequency
Score $\geq$ 70	8
Score < 70	6
Class Mean Score	71
Mastery Percentage	57%
Performance Category	Fair

Results showed that after the implementation of mind mapping based on CTL in Cycle I, there were significant improvements in reading comprehension compared to the baseline condition. The intervention was implemented in two instructional sessions and was assessed through reading comprehension tests, observations of the teacher and observations of the students. Results showed positive changes in learning outcomes and class participation but several things still need to be improved before the intervention could be considered fully successful. The reading comprehension test applied at the end of Cycle I revealed an increase in students' academic performance. Of the fourteen students, eight (57%) scored at or above the Minimum Mastery Criterion (MMC) of 70 and six students (43%) scored below the required standard. The class mean score improved from 59 in the pre-intervention stage to 71 in Cycle I with a total score of 990. The number of students achieving mastery level rose from four to eight students, which is a double of the baseline results. This shows that the CTL-based mind mapping had a positive effect on students' reading comprehension performance. However, the overall mastery level of 57% was still in the fair category which means that there is still a need for further instructional improvements. There was an overall improvement although the student with hearing impairment had not attained the level of reading comprehension expected of him. Like several other students, the participant still scored below the school's mastery criterion. Classroom observations showed that the student still had difficulties in extracting implicit information, organizing ideas from longer narrative texts, and making conclusions on their own. These findings suggested that the visual nature of mind mapping facilitated comprehension but further scaffolding and practice were still required for independent learning.

Teacher observation results indicated a significant change in instructional implementation between the two meetings. The observation instrument is composed of seven components of CTL with fifteen performance indicators. The teacher's score

improved from 46 points (75%) in the first meeting to 52 points (87%) in the second meeting, with an overall average of 81% rated as very good. There were significant gains in the use of visual cues, classroom discussions, contextual questioning and guidance during collaborative learning activities. However, observers observed that the teacher could encourage greater independence on the part of students by providing more opportunities for them to generate ideas and solve problems with less direct assistance. Data from student observation also showed encouraging progress during Cycle I. The average score on the observation increased from 2.5 on the first meeting to 2.9 on the second meeting. The average score on the observation was 2.7 which was fair. Students consistently performed in the building of mind maps, extraction of keywords, drawing of symbols and linking of concepts across branches. Furthermore, the student with hearing impairment was more involved in classroom activities and more confident in collaborative learning tasks. Improvements were seen, but some learning components were still relatively weak. Lower scores were found in the questioning, learning community, and authentic assessment stages for the first meeting. In the beginning, students were reluctant to ask questions, contribute ideas during group discussions, and evaluate the quality of their own mind maps. These improved in the second meeting with the addition of teacher guidance and clearer group responsibilities. However, the authentic assessment activities conducted across the classroom were still below the expected performance level, suggesting that students still needed more support in reflecting on and assessing their own learning outcomes.

Overall, the reflection results of Cycle I showed that the application of CTL-based mind mapping gave positive improvements in students' reading comprehension and classroom participation, although the expected level of mastery was not achieved. The average score of the class rose to 71 with 57% of students achieving the Minimum Mastery Criterion. Meanwhile, the observation results showed that the teacher's instructional performance was rated at 81% (very good) and the activity level of the student with hearing impairment rose from 62% in the first meeting to 73% in the second meeting with an overall average of 67% (fair). The most notable improvements were seen in authentic assessment, where the student was able to add missing information to the completed mind map with more guidance. However, issues still arose in the stages of questioning, learning community, and reflection indicating that the student still required additional scaffolding, better visual aids, and more structured opportunities to learn collaboratively. Following these findings, a number of revisions were planned for Cycle II, namely, providing partially completed visual mind maps, using picture-based prompts, strengthening collaborative roles within each group, extending reflection activities, and providing more motivational support to facilitate deeper comprehension of narrative texts and to encourage more independence in constructing meaning from the reading materials.

Cycle II

Cycle II was conducted based on the reflection of Cycle I which found some aspects that need to be improved especially for the student with hearing impairment. The revisions of the instruction aimed to strengthen the visual characteristics of the CTL-based mind mapping exercises, by adding picture-backed mind maps, visual cues, and instructional videos to visually illustrate abstract concepts within the story texts. In addition, lesson plans were changed to include repeated explanations, more organized collaborative learning, flexible group arrangements, and more interaction between teachers and students to make sure that all students fully understood the learning tasks. The changes were designed to increase visual scaffolding, improve students' understanding of narrative texts, and lead to more active engagement throughout the learning process. In both meetings, students worked on partially completed mind maps, by identifying keywords, answering questions that guided, selecting appropriate pictures and connecting the texts to their own experiences in real life, through the seven stages of Contextual Teaching and Learning (CTL) approach.

We found that the revised instructional strategy resulted in significant improvement in students learning engagement. Students in Cycle II are more confident than students in Cycle I in completing the mind maps, finding the main ideas, talking about their answers in groups, and explaining the connections between information from the text and real-life situations. The student with hearing impairment was more actively engaged in the collaborative discussions, completed the guided mind maps with more independence and demonstrated a greater understanding of narrative texts through visual representations and contextual examples. Increasing students' motivation and participation during classroom discussions and reflection activities, the structured learning materials, picture-supported activities, and other teacher guidance also enhanced students' motivation and participation. The reading comprehension assessment results at the end of Cycle II proved that the improvements in teaching were effective in attaining the desired learning objectives. All students, including the student with hearing impairment, achieved 100% mastery, scoring at or above the Minimum Mastery Criterion (MMC) of 70. Compared to Cycle I, students were significantly more successful in understanding narrative texts, recognizing main ideas and extracting meaning from reading materials independently. These results indicated that the enhanced CTL-based mind mapping intervention successfully facilitated reading comprehension by combining contextual learning with visual scaffolding to meet the learning characteristics of students with hearing impairment while benefiting the entire inclusive classroom.

Tabel 2. *Reading Comprehension Test Results of Grade V Students in Cycle II*

Reading Comprehension Test Results	Cycle II
Result	Frequency
Score $\geq$ 70	14
Score $<$ 70	0
Class Mean Score	85
Mastery Percentage	100%
Performance Category	Very Good

The reading comprehension test applied at the end of the II cycle evidenced a significant advance in the students' learning results. All fourteen students scored at or above the Minimum Mastery Criterion (MMC) of 70, resulting in a 100% mastery rate. The mean score of the class in Cycle I was 71 and increased to 85 in Cycle II. The total score of the class was 990 and

increased to 1185. These results indicate that the instructional changes after the reflection phase of Cycle I effectively enhanced students' comprehension of narrative texts. In particular, the student with hearing impairment who had not attained mastery in the previous cycle successfully achieved the required standard in Cycle II, suggesting that the additional visual scaffolding and contextual learning activities effectively supported comprehension. The improvement of students' achievement was also accompanied by the higher classroom engagement in the learning process. Students showed increased confidence in identifying keywords, completing guided mind maps, relating text to real life, and expressing their understanding during collaborative discussions. Students could build meaning more independently with the use of picture-supported mind maps, contextual questions and structured group activities, whilst reducing the cognitive demands of processing long narrative texts. These instructional modifications were particularly beneficial for the hearing-impaired student, who was more actively involved in classroom interactions and cooperative learning. In general, the results of Cycle II confirmed that the enhanced CTL-based mind mapping intervention was able to meet the goals of the classroom action research. The use of contextual learning principles, visual supports, collaborative learning and ongoing teacher support resulted in positive gains in both reading comprehension and student participation. As all the students achieved the expected learning outcomes and showed meaningful progress compared with Cycle I, the intervention was effective and no further action cycle was needed.

Table 3. *Reading Comprehension Scores of the Student with Hearing Impairment Across the Research Cycles*

No.	Assessment Stage	Score	Category
1	Pre-test	45	Did Not Achieve Mastery
2	Cycle I	60	Did Not Achieve Mastery
3	Cycle II	80	Achieved Mastery

Similar to Table 3, the reading comprehension performance of the student with hearing impairment improves consistently in the classroom action research. The student's score increased from 45 to 60 in the pre-test and cycle I, but was still below the Minimum Mastery Criterion (MMC). Cycle II the instructional revisions made the student's score increased to 80, the score exceeds the mastery criterion, and the desired learning outcomes were achieved successfully. This steady progression indicates that the mind mapping intervention based on the CTL effectively supported the student's reading comprehension by providing visual scaffolding, contextual learning experiences, and structured guidance that helped the student understand narrative texts.

Table 4. *Teacher Observation Scores Across Cycle I and Cycle II During the Implementation of CTL-Based Mind Mapping*

No.	CTL-Based Mind Mapping Phase	Cycle I		Cycle II	
		Meeting 1	Meeting 2	Meeting 1	Meeting 2
1	Constructivism	3.3	3.7	3.3	3.7
2	Inquiry	2.0	3.5	3.5	4.0
3	Questioning	3.0	4.0	3.0	3.0
4	Learning Community	3.0	3.7	3.7	4.0
5	Modeling	3.0	3.7	3.5	3.0
6	Reflection	3.0	3.0	3.3	3.7
7	Authentic Assessment	3.0	3.0	3.3	3.7

Table 4 Overall Improvement of Teacher's Implementation of CTL-based Mind Mapping in the Two Cycles of Action Research The most important progress was in the Inquiry phase with a score of 2.0 in the first meeting of Cycle I and 4.0 in the second meeting of Cycle II, showing the teacher was more and more effective in getting students to explore ideas on their own and connect learning to real-life experiences. Improvements were also seen in the Learning Community, Reflection and Authentic Assessment phases, which indicates better classroom facilitation, collaborative learning and formative assessment practices. The second meeting of Cycle II showed a slight decrease in the Modeling phase. However, the overall observation results showed that the teacher constantly improved instructional practices throughout the intervention, which created a more supportive and engaging learning environment for all students including the student with hearing impairment.

Discussion

The findings of this classroom action research show that the implementation of mind mapping based on CTL is effective in improving the reading comprehension of the student with hearing impairment and the learning outcomes of the students of Grade V. The reading comprehension score of the student with hearing impairment showed progressive increase from 45 in pre-test to 60 in Cycle I and 80 in Cycle II indicating that the intervention was successful in enabling the student to reach the Minimum Mastery Criterion (MMC). Likewise, the mean score of the class increased from 59 at baseline to 71 in Cycle I and 85 in Cycle II. These findings indicate that the combination of mind mapping with the principles of Contextual Teaching and Learning (CTL) is an effective instructional approach to support reading comprehension in inclusive elementary classrooms. This improvement can be explained by the learning characteristics of students with hearing impairment who need concrete experiences, repeated exposure, simplified concepts and visual learning supports. During the intervention, the teacher provided contextualized learning experiences that linked narrative texts to the students' lives, while also providing information through visual mind maps. In Cycle II, the learning materials were enriched with mind maps supported by pictures, guided questions, and visual demonstrations to reduce the abstract nature of narrative texts. The instructional modifications helped the student with hearing impairment to build meaning through direct experience rather than verbal explanations alone, which is consistent with the instructional principles for teaching students with hearing impairment as outlined by Aini et al. (2022).

Another important finding is the improvement during the Authentic Assessment Phase. The student with hearing impairment

demonstrated more accuracy in presenting facts, concepts and relationships in Cycle II after picture-supported mind maps were completed. The use of visual symbols, illustrations, and guided graphic organizers seemed to improve memory retention and promote conceptual understanding. This finding supports Yuliah (2016) which states that visual imagery and graphic structures in mind mapping are effective in optimizing information processing and Karimah et al. (2024) which states that verbal and visual thinking through mind mapping helps to make learning more meaningful, creative, and easier to understand. In addition, students showed increased ability to generate new information and to identify unknown words in the Authentic Assessment activities. Students didn't just memorize the information from the text, they sought out other meanings through discussions with classmates, textbooks and other learning resources before incorporating the new knowledge into their mind maps. These results demonstrate one of the significant features of CTL, namely motivating students to think critically, investigate information independently, and actively construct knowledge through the process of problem-solving (Nababan and Sipayung, 2023).

The Learning Community and Questioning phases also saw significant improvements. Students grew in their confidence to talk about narrative texts, to share ideas, to ask questions and to work together in their groups to solve comprehension problems. The student with hearing impairment had the advantage of structured interaction with peers that provided meaningful participation in class discussions, better communication skills, and better reading comprehension. Such findings are consistent with the work of Daud (2024), who highlights the role of inquiry and collaborative learning for enhancing deeper understanding through active communication and co-construction of knowledge. The results also showed that the transformation of long texts into compact visual forms by mind mapping significantly reduced students' cognitive load in reading comprehension. The students grasped the narrative structures better than the traditional text-based instruction by visually linking the main ideas, supporting details, characters, settings, and moral messages in a branching format. The finding supports Khairani et al. (2024) who stated that mind mapping can help learners to organize and communicate information in a meaningful way to aid comprehension. This finding is consistent with the previous findings of Radas Chaniago et al. (2023) and Indriawati et al. (2023) that contextual learning and mind mapping can improve students' reading comprehension by relating textual information to learners' prior knowledge and real-life experiences.

The intervention brought better quality of instruction and higher student achievement. The scores of the teachers' observation increased from 81% in Cycle I to 93% in Cycle II. This means that there were improvements in classroom management, instructional delivery, contextual questioning, collaborative facilitation, and formative assessment practices. There was also a dramatic increase in student participation throughout the intervention suggesting that students were more engaged, independent and confident during reading activities. Collectively, these findings indicate that CTL-based mind mapping improves reading comprehension of students with hearing impairment and also creates a more inclusive, interactive, and meaningful learning environment for all students in the classroom.

CONCLUSION

This classroom action research demonstrated that the implementation of CTL-based mind mapping effectively improved the reading comprehension of the student with hearing impairment as well as the overall reading achievement of Grade V students. The reading comprehension score of the student with hearing impairment increased from 45 in the pre-test to 60 in Cycle I and 80 in Cycle II, while all students achieved the Minimum Mastery Criterion (MMC) by the end of the intervention. The improvement was supported by the integration of structured visual mind maps with contextual learning experiences, enabling students to transform abstract narrative texts into meaningful and concrete concepts. Furthermore, students' learning participation increased throughout the intervention, particularly in authentic assessment, collaborative learning, and questioning activities, resulting in a more active, student-centered, and inclusive learning environment. The findings suggest that CTL-based mind mapping can serve as an effective instructional strategy for improving reading comprehension among students with hearing impairment in inclusive elementary classrooms. Teachers are encouraged to incorporate picture-supported mind maps and contextual learning activities to facilitate conceptual understanding and active student participation. Future research is recommended to investigate the effectiveness of this approach with different learning materials, disability categories, and educational settings to strengthen the empirical evidence supporting the use of CTL-based mind mapping in inclusive education.

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