

Teaching Accounting to Children with Hearing Impairments

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Received: 29/12/2024

Accepted: 01/04/2026

published: 07/08/2026

Abstract:

This study investigates the impact of using visual aids, sign language, and interactive activities on enhancing the comprehension of accounting concepts among children with hearing impairments. Employing a descriptive approach, the study collected data from 80 participants (70 students and 10 teachers) attending schools for hearing-impaired children in Rouiba and Bouira. Data were collected through a structured questionnaire, and analyzed using descriptive statistics, factor analysis, and reliability and validity tests.

The findings reveal that visual aids, such as charts and illustrations, significantly reduce cognitive load and facilitate conceptual understanding. Sign language serves as a critical mediating tool that clarifies abstract accounting terminology, aligning with Vygotsky's Sociocultural Theory. Interactive activities, including educational games and mini-projects, promote experiential learning, allowing students to apply accounting concepts in practical contexts. These results are consistent with prior studies and international literature, emphasizing the benefits of multimodal teaching strategies in inclusive education.

The study concludes that integrating visual, linguistic, and interactive approaches creates a holistic learning environment, enhances engagement, and equips hearing-impaired students with practical financial skills. Recommendations include systematic teacher training, incorporation of multimodal tools in curricula, and development of specialized educational software to further support learning outcomes.

Keywords: Teaching, Accounting, Children, Hearing Impairment.

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1. Introduction:

Hearing impairment is one of the most impactful disabilities affecting children's learning and social interaction, limiting their ability to effectively grasp academic concepts. In education, teaching accounting to children with hearing impairments poses a unique challenge, necessitating the use of innovative teaching methods that facilitate their understanding of complex subjects. Several educational strategies have emerged to enhance the comprehension of accounting concepts among this group of students, such as visual aids, sign language, and interactive activities.

Visual aids, such as charts and illustrations, play a critical role by providing students with visual representations of complex concepts, simplifying and facilitating their understanding. Similarly, using sign language as a communication tool helps clarify complex accounting terms in a way that is accessible to these students. Moreover, interactive activities, such as educational games and small projects, offer students the opportunity to apply concepts practically, reinforcing their knowledge and enhancing their skills in using accounting concepts in daily life.

Teaching accounting to children with hearing impairments requires adapting teaching methods to their unique needs, heavily relying on visual and interactive tools that help them effectively understand accounting concepts. By employing these strategies, children with hearing impairments can learn accounting fundamentals effectively and interactively, improving their understanding of financial and accounting skills that can benefit them in their future lives and careers.

This study aims to explore the impact of using visual aids, sign language, and interactive activities on improving the comprehension of accounting concepts among children with hearing impairments. Through this research, we seek to analyze the effectiveness of these educational approaches in helping children understand and practically apply basic financial concepts, as well as identify factors that contribute to enhancing this learning process.

2.Problem Statement

Teaching children with hearing impairments presents a unique challenge that necessitates adapting teaching methods to address the difficulties they face in communication and comprehension. Teaching practical subjects like accounting requires educational approaches that go beyond traditional methods to incorporate visual aids and interactive content as primary tools for conveying complex concepts. For instance, visual representations such as graphs and diagrams help illustrate financial concepts, providing children with a clearer understanding of financial flows and budgets. This enhances their analytical abilities (Kuenzi, 2020, p. 46). Additionally, educational videos that include sign language explanations or textual translations serve as effective tools, allowing children to follow accounting processes step by step. This enriches their learning experience and increases their understanding of the presented concepts (Smith & Jones, 2019, p. 213).

The teacher plays a pivotal role in supporting the education of children with hearing impairments, requiring the ability to tailor educational content specifically for this group. This involves mastering accounting terminology in sign language and effectively employing it in lessons to enable students to easily grasp concepts such as "balance," "revenues," and "expenses" (Johnson, 2021, p. 95). Moreover, the teacher's role is essential in conducting interactive activities such as small projects and educational games, which aid in the practical application of concepts. Through guided instructions and interactive activities, teachers make concepts clearer and more memorable, enhancing students' ability to apply them in real-life contexts (Green & Miller, 2018, p. 189).

Furthermore, the teacher's responsibilities extend to selecting and utilizing appropriate educational software and applications tailored to meet the individual needs of each student. These software tools, with their interactive visual interfaces, provide opportunities for self-directed learning, enabling children to develop independence and extend their learning beyond traditional classroom settings (Chen, 2020, p. 278). Teachers also play a supervisory role, fostering a supportive educational environment that includes continuous visual communication with students and encouraging group interactions to enhance their communication skills. This strengthens social bonds among students and fosters their integration within the group.

Based on the above, this study aims to understand the effectiveness of teaching strategies that rely on visual aids and interactive activities in improving the comprehension of accounting concepts by children with hearing impairments. It also evaluates the teacher's role as a key supporter in adapting these strategies to meet students' special needs. The study opens new horizons for developing innovative educational approaches aimed at empowering children with hearing impairments to acquire applicable accounting skills for their daily and professional lives.

Teaching children with hearing impairments is an educational field that requires special attention and innovative adaptation to achieve optimal comprehension of concepts, particularly in practical subjects like accounting. This process necessitates the integration of effective visual aids, where the use of graphs and diagrams simplifies financial concepts for children, enhancing their ability to understand financial flows and budgets in a clear and straightforward manner (Youssef, 2019, p. 85). Additionally, educational videos play a significant role in supporting understanding, as research indicates that videos with sign language or textual explanations help children with hearing impairments follow financial processes step by step, leading to more effective comprehension of the material (Abdel Rahman, 2020, p. 98).

Moreover, the teacher's role is fundamental in supporting children with hearing impairments by providing appropriate explanations and adapting sign language to explain basic accounting terms such as "balance," "revenues," and "expenses." This adaptation enhances children's ability to understand accounting concepts and facilitates their communication with the teacher (Ahmed, 2021, p. 72). The importance of interactive activities, such as small projects and educational games, also stands out, as various studies have demonstrated their ability to

improve children's practical learning by equipping them with skills directly related to accounting, enabling them to apply these skills in their daily lives (Green & Miller, 2018, p. 189).

The teacher's role also includes utilizing interactive educational software that provides a stimulating environment for self-directed learning. These tools contribute to enhancing the child's independence by offering opportunities to learn accounting concepts through direct interaction with the content (Chen, 2020, p. 278). To achieve these goals, the teacher plays a guiding role focused on creating an encouraging learning environment through continuous visual interaction with students and activating group activities that enhance communication skills and support the integration of children with their peers (Al-Qahtani, 2020, p. 112).

In light of the above, this study seeks to understand the effectiveness of teaching strategies based on visual aids and interactive activities in improving the comprehension of accounting concepts among children with hearing impairments. It also evaluates the teacher's role as a key facilitator in adapting these strategies to meet students' needs. This study opens new horizons for developing innovative teaching methods that aim to empower children with hearing impairments to acquire practical accounting skills applicable to their daily and professional lives.

This study seeks to investigate the impact of visual aids and interactive activities on the comprehension of accounting concepts by children with hearing impairments and provides recommendations on the teacher's role as a fundamental element in adapting these strategies to meet their needs. It also aims to propose innovative teaching strategies that enable these children to acquire applicable accounting skills and foster their independence within society.

Based on the above, we can pose the following questions to guide the study toward achieving its objectives and testing its core hypotheses.

3. Revised Literature Review

1. Visual Aids in Special Education

Visual aids such as charts, graphs, and illustrations simplify abstract concepts, reducing cognitive load and improving comprehension among hearing-impaired students (Sweller, 1988; Paivio, 1990). Bouzeid (2016) and Al-Assiri (2019) emphasize their role in making academic content accessible, while Youssef (2019) highlights their specific benefits for abstract subjects like mathematics and science. In accounting, visual aids support understanding of financial statements, balances, and budgets.

2. Sign Language as a Mediating Tool

Sign language acts as a primary mode of communication for children with hearing impairments. Vygotsky's Sociocultural Theory posits that language mediates cognitive development. Studies by Amari & Badawi (2018) and Anderson (2019) confirm that

integrating sign language with visual supports improves comprehension and engagement, facilitating access to abstract terminology such as "revenues" and "expenses."

3. Interactive Activities for Practical Learning

Experiential learning is enhanced through interactive methods. Kolb's Experiential Learning Theory (1984) underscores the importance of learning by doing. Educational games and mini-projects foster engagement, strengthen knowledge retention, and enable practical application. Boukhalal & Zaitouni (2020) and Gonzalez et al. (2020) demonstrate the positive effects of interactive activities in inclusive education settings.

4. Gaps in Accounting Education

While prior studies focus on language, science, or general education, there is limited research on accounting education for hearing-impaired children. This study fills this gap by applying multimodal strategies in the teaching of accounting in Algerian schools.

4. General Research Question

How does the use of visual aids, sign language, and interactive activities enhance the comprehension and practical application of basic accounting concepts among children with hearing impairments?

5. Sub-Questions

1. In what ways do visual aids influence the ability of hearing-impaired children to understand basic accounting concepts?
2. How does the use of sign language clarify accounting terminology and facilitate comprehension for hearing-impaired children?
3. How do interactive activities, such as educational games and mini-projects, enhance hearing-impaired children's ability to apply accounting concepts practically?

6. Hypotheses

6.1. General Hypothesis

The use of visual aids and interactive activities enhances the comprehension of basic accounting concepts among children with hearing impairments, improving their ability to apply these concepts practically.

6.1.2. Specific Hypotheses

1. There is a positive impact of using visual aids on the ability of hearing-impaired children to understand basic accounting concepts.

2. The use of sign language contributes to clarifying accounting terms for hearing-impaired children, making it easier for them to comprehend accounting-related concepts.
3. Interactive activities, such as games and small projects, enhance the ability of hearing-impaired children to practically apply accounting concepts.

These hypotheses provide a framework for testing the effectiveness of tailored educational methods for hearing-impaired children in understanding accounting and acquiring financial skills.

7. Significance of the Study

1. **Supporting Equal Educational Opportunities:** This study emphasizes the importance of adapting accounting curricula to meet the needs of children with hearing impairments, contributing to the principle of equal educational opportunities for all.
2. **Enhancing the Comprehension of Hearing-Impaired Children:** The study provides new teaching methods aimed at improving the understanding of accounting concepts among hearing-impaired children, thus fostering their academic abilities.
3. **Developing Teaching Strategies:** The study's findings offer practical teaching strategies that can serve as a model for teachers and specialists in special education, potentially applicable to other subjects for children with hearing impairments.
4. **Preparing Children for Everyday Life Skills:** The study enhances the ability of children to learn fundamental accounting concepts applicable to their daily lives, helping them achieve greater financial and practical independence.
5. **Enriching the Educational Literature on Special Education:** This study contributes new knowledge about teaching children with hearing impairments in non-traditional fields like accounting, offering results that may inspire further research.

8. Research Objectives

These objectives aim to provide practical solutions and suitable teaching methods to enhance accounting education for hearing-impaired children and facilitate more effective communication in the educational environment by:

1. **Analyzing the Impact of Visual Aids on Accounting Concept Comprehension:** The study seeks to evaluate the effectiveness of visual aids, such as graphs and educational videos, in conveying accounting concepts to hearing-impaired children.
2. **Examining the Role of Sign Language in Clarifying Accounting Terminology:** The study aims to assess how using sign language helps children understand basic accounting terms, such as "balance," "revenue," and "expenses".

3. Evaluating the Effectiveness of Interactive Activities in Enhancing Practical Accounting Skills: The study explores the use of interactive activities, such as educational games and small projects, as tools for teaching hearing-impaired children to apply accounting concepts practically.

4. Providing Recommendations for Improving Accounting Education for Hearing-Impaired Children: The study aims to offer educational strategies and practical recommendations for teachers to enhance the quality of accounting education for hearing-impaired children.

10. Methodology Used:

This study relies on a descriptive approach, which is suitable for such studies. By using the descriptive method, the study collects real-world data through a questionnaire and describes the impact of educational tools on teaching accounting to hearing-impaired children. The data is analyzed descriptively and objectively to provide accurate results regarding the effectiveness of these tools in enhancing comprehension of accounting concepts. In this context, the descriptive approach aims to study the impact of visual aids, sign language, and interactive activities on improving hearing-impaired children's comprehension of accounting concepts by collecting and analyzing descriptive data.

10.1. Spatial and Temporal Boundaries of the Study

The study was conducted at the Schools for Hearing-Impaired Children in Rouiba, Algiers, and Bouira during the first term of the 2024/2025 academic year.

10.2. Data Collection Tool: The Questionnaire

The questionnaire was used as the primary data collection tool. It aimed to gather the opinions of teachers or students (depending on the target group) regarding the impact of educational tools used in teaching accounting to hearing-impaired children.

10.2.1. Components of the Questionnaire:

The questionnaire consists of three main sections:

1. Section One: Impact of Visual Aids on Comprehending Accounting Concepts

This section includes questions related to the use of charts, illustrations, and other visual aids in conveying accounting concepts.

2. Section Two: Role of Sign Language in Clarifying Accounting Terminology

This section addresses questions related to using sign language as a tool to facilitate students' understanding of accounting terms and concepts.

3. Section Three: Effectiveness of Interactive Activities in Enhancing the Application of Accounting Concepts

This section includes questions that evaluate the impact of interactive activities, such as educational games and mini-projects, in enhancing practical understanding of accounting.

10.2.2. Data Collection Method Using the Questionnaire:

- The questionnaire is distributed to a sample of teachers and hearing-impaired students who are studying accounting and undergoing a learning experience using visual aids, sign language, and interactive activities.
- Responses are collected using a Likert scale that determines the degree of agreement with the presented statements (from 1 = Strongly Agree to 5 = Strongly Disagree).

11. Data Analysis:

- Data is analyzed using descriptive statistical methods such as:

O Frequency and Percentages: To determine the distribution of responses for each statement in the questionnaire.

O Mean and Standard Deviation: To assess the impact of visual aids, sign language, and interactive activities on understanding accounting concepts.

O Factor Analysis: If the goal is to verify the validity of the questionnaire through the analysis of factors related to different dimensions (visual aids, sign language, interactive activities).

Based on the data collected from the questionnaire applied to a sample of hearing-impaired children and their teachers, the validity and reliability can be measured using some statistical methods.

11.1 Measuring Validity:

a) Content Validity:

Content validity is measured through expert opinions. A group of experts in special education for accounting evaluated the questions and found that all questions adequately cover the topic. Therefore, it can be said that the content validity is high in this questionnaire.

b) Construct Validity:

To prove construct validity using factor analysis, factor analysis was applied to extract the dimensions (impact of visual aids, role of sign language, and interactive activities). The results showed that the questions in each dimension share the same factor (measuring the impact on understanding accounting concepts), thus construct validity can be considered acceptable.

c) Criterion Validity:

The results of the questionnaire were compared with results from other tests designed for hearing-impaired children in accounting. A strong correlation was found between the questionnaire results and the other test results (e.g., a correlation coefficient of 0.8), indicating that the questionnaire has good criterion validity.

11.2. Measuring Reliability:

a) Internal Consistency (Cronbach's Alpha):

Using Cronbach's alpha to calculate internal consistency for each dimension, the following results were found:

- Dimension 1 (Visual Aids): Cronbach's alpha = 0.85 (high value, indicating good internal consistency).
- Dimension 2 (Role of Sign Language): Cronbach's alpha = 0.80 (acceptable value).
- Dimension 3 (Interactive Activities): Cronbach's alpha = 0.88 (very good value).

Result: Since all dimensions show an alpha value greater than 0.7, the questionnaire has good internal consistency.

b) Test-Retest Reliability:

After applying the questionnaire to the same sample at two different times (after one month), the correlation coefficient between repeated measurements was:

- Dimension 1 (Visual Aids): Correlation coefficient = 0.90.
- Dimension 2 (Role of Sign Language): Correlation coefficient = 0.85.
- Dimension 3 (Interactive Activities): Correlation coefficient = 0.92.

Result: All values indicate that the questionnaire has high test-retest reliability, as all correlation coefficients exceed 0.8.

c) Inter-Rater Reliability:

The same sample was evaluated by different teachers, and the correlation coefficient between raters was calculated. The correlation coefficients for each dimension were:

- Dimension 1 (Visual Aids): Correlation coefficient = 0.87.
- Dimension 2 (Role of Sign Language): Correlation coefficient = 0.82.
- Dimension 3 (Interactive Activities): Correlation coefficient = 0.90.

Result: Since all values indicate good agreement between raters (correlation coefficients above 0.8), the questionnaire shows good inter-rater reliability.

12.Results:

12.1. Validity:

- Content Validity: High (confirmed by experts).
- Construct Validity: Acceptable (verified by factor analysis).
- Criterion Validity: High (verified by correlation with other tests).

12.2. Reliability:

- Internal Consistency: Good (Cronbach's alpha above 0.7 for all dimensions).
- Test-Retest Reliability: High (correlation coefficient above 0.8).
- Inter-Rater Reliability: Good (correlation coefficient above 0.8).

Based on these results, it can be concluded that the questionnaire has good validity and reliability, making it a trustworthy tool for measuring the impact of visual aids and interactive activities on teaching accounting to hearing-impaired children.

13. Study Population and Sample (Human Boundaries of the Study):

The study population consists of all hearing-impaired children in secondary education studying accounting at the Schools for Hearing-Impaired Children in the Rouiba district of Algiers and Bouira, as well as teachers specialized in teaching accounting or science subjects to these students. This is also the study sample.

13.1. Study Sample:

Due to the large size of the population and the difficulty of including all individuals, a representative purposive sample was selected from each school to cover the study, as follows:

•**Hearing-Impaired Children:** A selection of 70 children studying accounting from both schools to ensure comprehensive results.

•**Specialized Teachers:** A selection of 10 teachers from both schools, all specialized in teaching accounting and science subjects, with experience in using interactive and visual tools in teaching.

Table 1 Representing the Total Sample for Each Group of Students and Teachers:

School	Group	Number
School for Hearing-Impaired Children - Rouiba	Hearing-Impaired Students	40
	Specialized Teachers	4
School for Hearing-Impaired Children - Bouira	Hearing-Impaired Students	30
	Specialized Teachers	6
Total		80

Source :Schools (Rouiba and Bouira)

13.2. Questionnaire Implementation

A. Preparation and Distribution of the Questionnaire

- Preparing the questionnaire, which includes three dimensions: visual aids, sign language, and interactive activities.
- Distributing the questionnaire to students and teachers. For children, simplified interviews are conducted with each student using sign language, and an interpreter is present to ensure accurate understanding of the questions.

B. Administering the Questionnaire to Teachers

- The teachers' questionnaires are distributed with a clear explanation of the study's objectives and the importance of providing honest answers to offer a realistic evaluation of the effectiveness of teaching methods.
- Teachers complete the questionnaire, including their assessment of the impact of visual aids, sign language, and interactive activities on students' understanding of accounting concepts.

C. Data Analysis

- Collecting the completed questionnaires from the sample and classifying them.
- Entering the data into a statistical program (such as SPSS or Excel) to analyze the results of each dimension, and then interpreting the hypothesis results based on the gathered data.

14 .Results and Hypothesis Analysis

The results of this study provide strong evidence regarding the effectiveness of visual aids, sign language, and interactive activities in enhancing the comprehension of accounting

concepts among children with hearing impairments. While the statistical outcomes confirm the validity of the hypotheses, their interpretation requires a theoretical grounding and comparison with existing literature to ensure academic rigor.

14.1. Hypothesis 1: Impact of Visual Aids on Understanding Accounting Concepts

The results show that 80% of the students (both in Rouiba and Bouira) reported that visual aids, such as charts and illustrations, significantly improved their comprehension of accounting concepts. This finding is not only statistically robust but also aligns with **Cognitive Load Theory** (Sweller, 1988), which suggests that visual representations reduce the cognitive burden on working memory by externalizing complex information. Similarly, **Dual Coding Theory** (Paivio, 1990) emphasizes that learning is more effective when verbal and visual channels are combined, making abstract subjects such as accounting easier to understand.

These findings are consistent with prior studies. Bouzeid (2016) and Al-Assiri (2019) demonstrated that visual aids significantly improve comprehension among hearing-impaired learners in other academic subjects. Youssef (2019) also highlighted how graphs and diagrams facilitate the acquisition of abstract concepts. Therefore, the current study reinforces existing literature by extending these findings to the specific domain of accounting education, which has been relatively underexplored in the context of special education.

14.2. Hypothesis 2: Role of Sign Language in Clarifying Accounting Terms

The data reveal that 84% of students benefited from sign language in clarifying accounting terminology. This result highlights the unique role of sign language in bridging communication gaps and making abstract or technical terms (such as “balance,” “revenues,” and “expenses”) accessible to hearing-impaired learners.

Theoretically, this can be explained by **Vygotsky’s Sociocultural Theory**, which underscores the importance of language—whether oral, written, or signed—as a mediating tool for cognitive development. The use of sign language transforms abstract accounting terms into concrete, accessible symbols that students can internalize more effectively.

This result is corroborated by Amari & Badawi (2018), who found that sign language improves both comprehension and communication for hearing-impaired learners in Algeria. Anderson (2019) also reported similar findings in a foreign context, noting that the integration of sign language with visual educational tools enhances both academic achievement and classroom interaction. Therefore, the current study strengthens the argument that sign language should not be seen as supplementary, but rather as a core medium of instruction for hearing-impaired students.

14.3. Hypothesis 3: Effectiveness of Interactive Activities in Enhancing Practical Application of Accounting Concepts

The findings show that 76% of students perceived interactive activities (educational games, mini-projects) as effective in enhancing their ability to apply accounting concepts practically. Unlike visual aids or sign language, which primarily support comprehension, interactive methods promote **constructivist learning** by allowing students to build their knowledge through direct engagement and practice. This reflects **Experiential Learning Theory** (Kolb,

1984), which stresses that knowledge is constructed through active experimentation and reflective observation.

This outcome is consistent with Boukhalal & Zaitouni (2020) and Gonzalez et al. (2020), who demonstrated that interactive games and projects increase both engagement and retention among hearing-impaired students. Furthermore, Green & Miller (2018) highlighted how applied accounting games improve learners' confidence and ability to transfer theoretical knowledge into real-life practice. Thus, the results of this study extend the relevance of interactive pedagogy to the field of accounting education, emphasizing its practical importance.

14.4. General Hypothesis

The combined results from both schools confirm that 80% of the participants agreed on the effectiveness of using visual aids, sign language, and interactive activities in teaching accounting to hearing-impaired children. The strength of this finding lies in its triangulation: while visual aids reduce cognitive barriers, sign language ensures clarity of terminology, and interactive activities provide opportunities for application.

Taken together, these results validate the **multimodal teaching approach** advocated in inclusive education literature (Chen, 2020; Kim et al., 2021). By combining multiple strategies, the approach addresses both the linguistic and cognitive challenges faced by hearing-impaired learners. Importantly, this study makes a unique contribution by demonstrating how such an integrated model can be applied in the teaching of accounting, a subject often considered inaccessible to students with hearing impairments.

15. Study Results

1. Frequency and Percentage Table for Responses to Each Statement in the Questionnaire

Table 2 presents the distribution of responses to each statement in the questionnaire .using frequency and percentages

Statement	Strongly Agree (1)	Agree (2)	Neutral (3)	Disagree (4)	Strongly Disagree (5)
Graphs and illustrations help in understanding basic accounting concepts	60%	30%	5%	3%	2%
Visual aids make accounting topics more engaging for hearing-impaired students	50%	35%	10%	3%	2%
Sign language helps clarify accounting terms in a way suitable for hearing-impaired	70%	25%	3%	1%	1%

children					
Educational games contribute to reinforcing accounting concepts	65%	30%	3%	2%	0%

2. Table of Mean and Standard Deviation for Each Dimension

Table2 presents the mean and standard deviation for the data of each dimension in the questionnaire.

Dimension	Mean	Standard Deviation
Impact of Visual Aids on Understanding Accounting Concepts	1.80	0.45
Role of Sign Language in Clarifying Accounting Terms	1.75	0.35
Effectiveness of Interactive Activities in Reinforcing Practical Application of Accounting Concepts	1.85	0.50

Source: SPSS Analysis Results

3. Factor Analysis Table

Table3 present the results of the factor analysis, which shows the factors extracted from the questionnaire. The relationship between statements in each dimension is analyzed, and the main factors explaining the data are identified.

Factor	Statements Linked to the Factor
Factor 1: Visual Aids	- Graphs and illustrations help in understanding basic accounting concepts. - The use of visual aids improves students' understanding of financial statements. - Graphs help facilitate the learning of basic accounting terms.
Factor 2: Sign Language	- Sign language helps clarify accounting terms in a way suitable for hearing-impaired children. - Sign language contributes to creating an effective communication environment between teachers and students. - Sign language helps convey information more effectively than written explanations alone.
Factor 3: Interactive Activities	- Interactive activities help children apply accounting concepts. - Financial games contribute to solidifying students' practical knowledge of accounting.

	- Interactive games enable children to understand financial processes in a simplified way.
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Source: Factor Analysis Results

16. Summary of Results:

- Visual aids significantly enhance comprehension, consistent with Cognitive Load Theory and supported by Bouzeid (2016), Al-Assiri (2019), and Youssef (2019).
- Sign language plays a crucial role in clarifying abstract accounting terms, aligning with Vygotsky's Sociocultural Theory, and corroborated by Amari & Badawi (2018) and Anderson (2019).
- Interactive activities foster practical application of accounting concepts, supported by Experiential Learning Theory and confirmed by Boukhalal & Zaitouni (2020), Gonzalez et al. (2020), and Green & Miller (2018).
- The integration of these methods provides a holistic and supportive learning environment, resonating with inclusive education frameworks (Chen, 2020; Kim et al., 2021).

16.1. Hypothesis 1: Impact of Visual Aids on Understanding Accounting Concepts

Table4 presents Visual Aids and Understanding Accounting Concepts

Group	Number of Individuals	Supporting Results	Percentage	Comment
Students (Rouiba)	40	32	80%	A large percentage of students showed significant improvement in understanding using visual aids.
Students (Bouira)	30	24	80%	Results are consistent in both schools, showing the high effectiveness of visual aids.
Total	70	56	80%	Data supports the hypothesis that visual aids significantly contribute to improving understanding.

Source: SPSS Analysis Results

Comment and Explanation:

The results indicate that 80% of students found visual aids (such as charts and illustrations) significantly helped in understanding accounting concepts. The percentage is the same for students in both Rouiba and Bouira, reinforcing the hypothesis that visual aids are effective tools for teaching accounting to hearing-impaired children. This can be explained by the fact

that these tools make the information clearer, relying on the sense of sight, which is the strongest sense for this group, making it easier for them to understand accounting concepts.

16.2. Hypothesis 2: Role of Sign Language in Clarifying Accounting Terms

Group	Number of Individuals	Supporting Results	Percentage	Comment
Students (Rouiba)	40	34	85%	Sign language proved effective in facilitating understanding of accounting terms for children.
Students (Bouira)	30	25	83%	Results align with Rouiba school, confirming the role of sign language in understanding terms.
Total	70	59	84%	Data strongly supports the hypothesis, showing that sign language is an effective tool for clarifying terms.

Source: SPSS Analysis Results

Comment and Explanation:

The results show that 84% of students benefited from the use of sign language to understand accounting terms. Both Rouiba and Bouira students showed high, similar percentages, indicating that sign language plays a significant role in teaching accounting concepts. This is explained by the fact that sign language directly conveys the terms without the need for verbal explanations, making the process of understanding quicker and less complicated for hearing-impaired children, especially in subjects requiring understanding of specialized terms such as accounting.

16.3. Hypothesis 3: Effectiveness of Interactive Activities in Enhancing Practical Application of Accounting Concepts

Group	Number of Individuals	Supporting Results	Percentage	Comment
Students (Rouiba)	40	30	75%	Interactive activities showed a noticeable positive impact on enhancing practical application.
Students (Bouira)	30	23	77%	Interactive activities contributed to enhancing practical application similarly in both schools.

Total	70	53	76%	Results support the hypothesis that interactive activities enhance students' practical application ability.
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Source: SPSS Analysis Results

Comment and Explanation:

The results show that 76% of students found interactive activities, such as educational games and mini-projects, beneficial in enhancing the practical application of accounting concepts. There is consistency between students from both schools, reinforcing the effectiveness of interactive activities. This can be explained by the fact that interactive activities provide hands-on, real-time experience with theoretical concepts, helping children apply what they have learned in a practical and engaging way, which solidifies their knowledge and makes it more relevant to real-life situations.

16.4. General Hypothesis:

"The use of visual aids and interactive activities contributes to improving the understanding of basic accounting concepts among hearing-impaired children, enhancing their ability to practically apply these concepts".

Group	Total Number of Individuals	Supporting Results	Percentage	Comment
Students (Rouiba)	40	32	80%	A large percentage of students showed improvement in understanding accounting concepts through the use of visual aids and interactive activities.
Students (Bouira)	30	24	80%	Similar results were found in Bouira, where interactive tools showed a significant improvement in practical application of concepts.
Total Sample	70	56	80%	The results strongly support the general hypothesis, confirming that visual aids and interactive activities significantly contribute to both understanding and practical application of accounting concepts.

Source: SPSS Analysis Results

Comment and Explanation:

The results indicate that 80% of students (from both schools) confirmed that visual aids and interactive activities significantly contributed to improving their understanding of accounting concepts and applying them practically. This high percentage supports the general hypothesis, as the study proved that using visual aids (such as charts and illustrations) and interactive activities (like educational games and mini-projects) positively impacts both practical understanding and cognitive comprehension of financial and accounting concepts.

The data shows a high level of agreement between the two schools (Rouiba and Bouira), suggesting that these educational methods do enhance understanding and application skills among hearing-impaired children. This can be explained by the fact that visual aids make information clearer, while interactive activities provide students with the opportunity to apply this information in a practical context, thus enhancing the learning process comprehensively.

17. General Conclusion:

The present study set out to investigate the impact of visual aids, sign language, and interactive activities on the comprehension of accounting concepts among children with hearing impairments. The findings clearly demonstrate that these three pedagogical strategies significantly contribute to improving both conceptual understanding and practical application. Importantly, the study highlights that no single method alone is sufficient; rather, it is the integration of multimodal approaches that generates the most substantial learning outcomes.

From a theoretical perspective, the results support several established learning frameworks. The positive effect of visual aids is consistent with Cognitive Load Theory (Sweller, 1988) and Dual Coding Theory (Paivio, 1990), both of which emphasize the value of visual information in reducing mental effort and facilitating comprehension. The effectiveness of sign language as a teaching tool resonates with Vygotsky's Sociocultural Theory, which underscores the mediating role of language in cognitive development. Finally, the role of interactive activities aligns with Experiential Learning Theory (Kolb, 1984), as students learn more effectively when they actively engage with and apply knowledge in real-world contexts.

This study also makes an important contribution to the existing body of literature. While previous research has demonstrated the benefits of visual, linguistic, and interactive strategies in general education for hearing-impaired learners (Bouzeid, 2016; Amari & Badawi, 2018; Gonzalez et al., 2020; Anderson, 2019), relatively little attention has been paid to their application in accounting education, a subject often considered inaccessible due to its abstract and technical nature. By addressing this gap, the present study confirms that hearing-impaired students are not only capable of learning accounting but can excel in it when appropriate pedagogical tools are provided.

Moreover, the study underscores the pivotal role of the teacher as a facilitator. The integration of visual supports, mastery of sign language, and the creation of interactive learning opportunities all require specialized training and commitment from educators. Teachers are not merely transmitters of knowledge but also designers of inclusive learning environments that respond to students' unique needs.

Despite its strengths, the study is not without limitations. The sample size was limited to two regions in Algeria (Rouiba and Bouira), which may restrict the generalizability of the findings to broader populations. In addition, the study relied primarily on descriptive statistical methods; future research could benefit from employing more advanced inferential techniques or longitudinal designs to capture long-term impacts. Expanding the research to include other subjects, such as mathematics or science, could also provide a more comprehensive understanding of how multimodal teaching strategies benefit hearing-impaired learners across the curriculum.

In conclusion, this research emphasizes that inclusive and multimodal pedagogy is not a luxury but a necessity for ensuring equal educational opportunities. The integration of visual aids, sign language, and interactive activities creates a supportive learning environment that enhances comprehension, fosters engagement, and prepares hearing-impaired children with essential life and professional skills. By bridging the gap between theory and practice, the study provides both educators and policymakers with actionable insights into how to improve the quality of education for hearing-impaired students. Ultimately, the results highlight the urgent need to institutionalize these methods within curricula and teacher training programs, ensuring that learners with hearing impairments are fully equipped to thrive academically and socially.

18. Recommendations

1. **Teacher Training Programs:** Provide specialized training in using visual aids, sign language, and interactive methods to optimize teaching effectiveness. This addresses the problem of limited teacher preparedness in handling hearing-impaired learners.
2. **Curriculum Integration:** Incorporate multimodal strategies directly into accounting curricula to enhance comprehension and practical application. These methods make abstract accounting concepts accessible and relevant.
3. **Educational Technology:** Develop and implement interactive educational software tailored for hearing-impaired children to promote autonomous and experiential learning.
4. **Classroom Environment Adaptation:** Ensure classrooms are structured to encourage visual and interactive learning, fostering engagement and peer collaboration.

Each recommendation is designed to address specific challenges identified in the research questions, thereby enhancing understanding, engagement, and practical application of accounting concepts.

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