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A meaningful and collaborative approach**

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Enhancing reading and writing instruction in inclusive environments: A meaningful and collaborative approach

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Article Information	Abstract
<p>DOI: 10.14527/edure.2024.01</p> <p>Article History: Received 10 December 2023 Revised 13 January 2024 Accepted 21 January 2024 Online 25 January 2024</p> <p>Keywords: Inclusive environments, Meaningful reading, Collaborative learning.</p> <p>Article Type: Research paper</p>	<p>In inclusive educational settings, educators often face challenges in effectively allocating time and providing appropriate support for students with disabilities. This research aims to address these challenges by proposing a complementary method that integrates seamlessly with conventional teaching approaches, benefiting both teachers and students in the realm of reading and writing education. The primary objective is to develop a comprehensive design that supports reading and writing instruction within an inclusive environment. The proposed approach adopts a holistic perspective by incorporating classroom walls, cubes, and diverse notebooks into the learning environment. At its core, this approach revolves around two fundamental elements: the utilization of meaningful reading and writing methods and the emphasis on collaborative learning. The study is substantiated by three tiny-research initiatives, providing practical insights into the implementation of inclusive classrooms aligned with the proposed recommendations. This research introduces a holistic design, and through various investigations conducted during its development, addresses key aspects such as the design specifications for the cubes, the functionality of notebooks facilitating interaction between walls and cube surfaces, and strategies for facilitating unhindered reading and writing instruction. The findings contribute to answering crucial questions on considerations for creating an inclusive and effective learning environment for primary reading and writing instruction.</p>



Introduction

Reading and writing serve as foundational skills that empower individuals to access information, enhance cognitive abilities, and actively engage in social interactions. These skills are pivotal for both personal and professional success, contributing significantly to the broader societal development. Reading, in particular, serves as the gateway to knowledge, offering individuals the means to expand their intellectual horizons, comprehend diverse perspectives, and foster critical thinking skills. On the other hand, writing enhances the capacity to organize and articulate thoughts, facilitating effective communication (Fitzgerald & Shanahan, 2000). Consequently, the instruction of reading and writing stands as a crucial determinant not only in preparing individuals to navigate the demands of the information age but also in elevating their ability to participate in the world with heightened awareness and effectiveness.

The initial stages of teaching reading and writing, commencing at an early age, represent a pivotal juncture in an individual's life. This phase establishes a foundational platform for the development of language skills, exploration of cognitive realms, and active participation in social dynamics. The acquisition of fundamental reading and writing skills not only enhances the comprehension of word and letter combinations but also fosters the individual's curiosity and motivation for learning (Shanahan, 2006). Therefore, the provision of effective reading and writing instruction during this formative period lays the groundwork for future success by contributing to personal and social development, as well as academic achievements.

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The term "inclusive environment" denotes an educational model characterized by inclusivity and integration, where students with diverse learning and developmental needs share the same educational setting. This framework facilitates students' preparation for societal diversity by fostering an understanding and appreciation of each other's differences, thereby nurturing the development of essential social skills. The primary objective of an inclusive environment is to afford equal opportunities for every student to realize their individual potential to the fullest extent, providing a supportive and empathetic educational atmosphere (Mattson & Roll-Pettersson, 2007). Within this context, a fundamental determinant of success in an inclusive environment is the development of flexible teaching methods by teachers and education administrators, tailored to address the unique needs of individual students.

Inclusive education represents an approach that allows students with diverse learning needs to engage in collective learning within the same educational milieu. During the initial stages of teaching reading and writing within this context, emphasis should particularly be placed on considerations related to diversity and individual differences. Given the distinct learning speeds and styles of each child, it is crucial for teachers to formulate personalized education plans and incorporate diverse learning methods and materials (Fälth & Selenius, 2022). Furthermore, the organization of activities that promote social interaction and collaboration among students during the early phases of reading and writing instruction in inclusive classrooms is instrumental in fostering the development of both academic and social skills for all students. This approach not only fortifies individual achievements but also enhances the sense of community and mutual understanding within the classroom.

Teaching initial reading and writing marks a crucial milestone in the educational journey of children, and this process gains enhanced efficacy and significance through collaborative efforts. Collaborative studies facilitate student interactions with both peers and teachers, transforming the learning experience into a social and interactive endeavor (Vaughn, Hughes, Schumm & Klingner, 1998). Such collaborative activities provide students with opportunities to articulate their thoughts, listen to others' ideas, and cultivate teamwork skills. Moreover, it enables students to comprehend reading and writing skills from various perspectives and apply them in real-world scenarios. This approach fosters increased active participation in the learning process and contributes significantly to the development of students' self-confidence.

Reading with understanding entails uncovering meanings beyond the text, delving into a profound comprehension by connecting the material to individual experiences. This process involves comprehending the text not only word for word but also in its entirety, establishing connections with the ideas it conveys. Reading with comprehension transcends mere reading by scrutinizing the underlying themes, intentions, and contexts of the text. This enables the reader to question the text, engage in critical thinking, and apply acquired knowledge to their own life. For a meaningful reading experience, the reader must establish connections between previously held information and new information, draw conclusions using textual clues, and integrate the information provided by the text with their own thoughts and experiences (Cook & Mayer, 1983). This thorough process ensures that reading goes beyond being a mere means of acquiring information and evolves into an activity that shapes an individual's mindset and worldview.

When posing the question "Why should we read it?" to children in the process of learning to read and write, it is essential to approach it in a manner that ignites their curiosity and imagination. Explaining to children that reading entails discovering new worlds, encountering diverse characters, and embarking on exciting adventures is likely to capture their attention. Furthermore, practical benefits of reading, such as gaining knowledge, expanding vocabulary, and developing thinking skills, can be elucidated through simple and age-appropriate examples (Irkinovich & Izatullaevna, 2022). For instance, providing examples of how reading can enhance their storytelling abilities or contribute to improved academic performance can be beneficial. Throughout this process, children should be encouraged to cultivate a positive attitude towards reading by highlighting that it serves not only as a learning tool but also as a enjoyable and fun activity.

The effectiveness of the learning environment plays a pivotal role in students' success and is directly associated with concepts such as "Cohesiveness, Satisfaction, Goal Direction, Disorganization, and Friction." In a classroom setting, a strong sense of togetherness and harmony (Cohesiveness) among students fosters a positive attitude towards both their peers and the learning process. This sense of unity encourages students to provide mutual support and engage in collaborative efforts within the group. Additionally, students' satisfaction with in-class activities enhances their interest and active participation in classes. Establishing clear and understandable learning goals enables students to comprehend what they aim to achieve and empowers them to take the necessary steps toward attaining these objectives (Fraser, 1998).

Conversely, disorganization and chaos within a classroom setting can have a detrimental impact on the learning process. An orderly and well-organized classroom environment facilitates distraction-free learning for students. Additionally, it is crucial to maintain low levels of friction and discord in the classroom, as such negative dynamics can hinder students' focus on learning and harm interpersonal relationships within the classroom. Teachers' attention to these aspects and the development of proactive strategies are instrumental in enhancing the academic and social success of students by improving the quality of the classroom learning environment (Fraser, 1998).

In this research, a comprehensive design is presented, focusing on the development of a learning environment tailored for reading and writing with comprehension. Various studies conducted during the development of this design sought to answer critical questions such as "What should the design of the cubes be like?", "How should the notebooks be structured to facilitate interaction between the wall displays and cube surfaces?", and "How can reading and writing be taught effectively without impediments?" These inquiries were aimed at ensuring that the proposed educational tools and methods effectively support the learning process, taking into account the diverse needs of students.

Strategies for Enhancing Reading and Writing Skills through a Six-Walled Inclusive Classroom Environment

The physical structure of the classroom, encompassing the four side walls, the floor, and two ceiling surfaces, presents a unique opportunity for literacy development. Utilizing all six walls for literacy instruction entails creating an immersive environment where children are constantly surrounded by educational stimuli. This approach involves labeling all classroom components, such as flower pots, blackboards, and doors, with their names. Additionally, walls should be adorned with images of items, plants, animals, names, and cities, accompanied by relevant text in the spaces between. Below is a detailed description of what each of these six walls can feature, along with illustrative examples.

First wall: The focal point for literacy

This wall is distinguished by the presence of a bookshelf, which should house a diverse collection of books, ranging from basic to advanced levels, including picture books, audiobooks, Braille, and books in the Latin alphabet, suitable for different reading levels. The books should be organized into different levels for ease of access. It is advisable to place live plants on the bookshelf to create a lively atmosphere (see Figure 1). The remaining wall space, apart from the bookshelf area, should be covered with pictures of animals, plants, and objects for additional learning opportunities.



Figure 1. Depicts a thoughtfully arranged bookshelf with an open cabinet door, plants labeled with their names, and educational stickers on the wall.

Additionally, it is recommended to place a piggy bank on this wall. The money collected in the piggy bank, for various reasons, can be used by students to purchase books of their choice from bookstores or subscribe to magazines appropriate for their reading level.

Second wall: Window to the world

This wall features windows that overlook the school garden and are adorned with pictures of animals, objects, and plants, each labeled with their names. Additionally, a small model of the school garden should be placed near the windows. This model serves a dual purpose: it helps sighted students describe the garden to their blind peers, and it becomes a focal point for discussions and storytelling, thereby enhancing verbal skills and relationships. Teachers can leverage the views from these windows to spark conversations, narrate events happening in the garden, and even inspire imaginative discussions about non-existent garden toys. Some windows should be left clear for writing exercises with steam, providing an interactive and fun way for students to practice writing. The placement of illustrated and written posters on the windows should be strategic; they should be visible to standing students but not obstruct the view from a seated position.

Third wall: Digital gateway

This wall is equipped with digital screens, including a giant interactive board, which connects the classroom to the outside world (see Figure 2). These screens enable the use of modern applications, viewing of documentaries, and video connections with other classes. The content should be relevant to the animals, plants, cities, and objects featured in the classroom, thereby reinforcing the learning experience. It's essential that the most frequently used letters in the language being taught are prominently displayed on this wall, particularly around the focal point of the wall, to facilitate frequent exposure and practice.



Figure 2. Shows an interactive board surrounded by posters with written pictures, demonstrating how digital and traditional learning materials can be integrated.

Fourth wall: The classic blackboard

A traditional blackboard remains an indispensable tool in primary education for teaching reading and writing (see Figure 3). The size of the blackboard should be appropriate for both teacher and student use. Teachers must be adept at using the board effectively, ensuring that their writing is legible and can be replicated by the students. Encouraging students to use the blackboard outside of formal lesson times is crucial for practicing their writing skills.

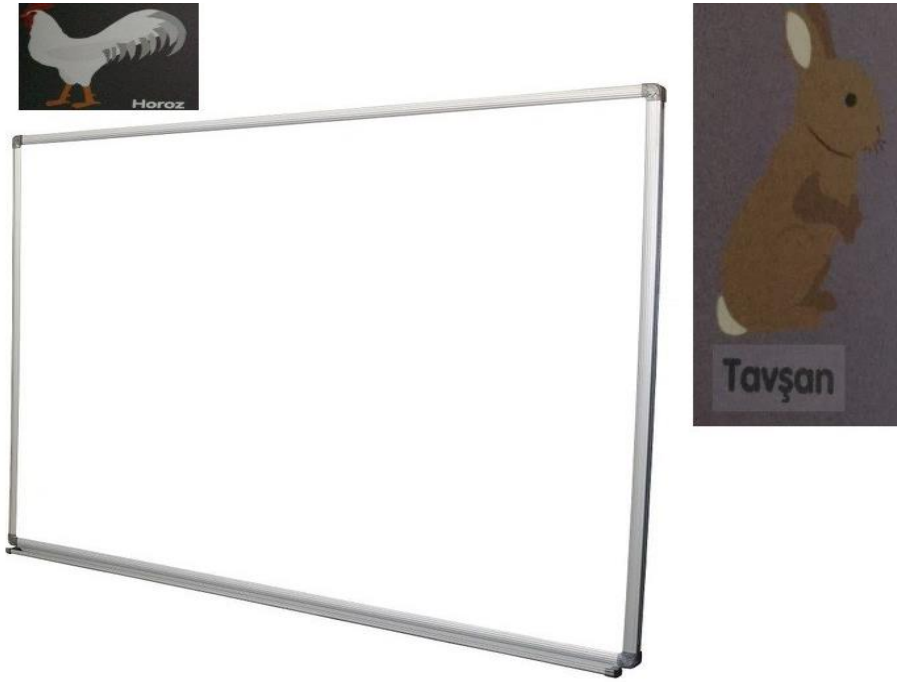


Figure 3: Depicts a blackboard with clearly written text and surrounded by educational posters, highlighting the importance of traditional teaching tools in a modern educational setting.

When placing written and illustrated posters on this wall, it's important to avoid clutter and confusion. Simple, single-syllable words like "ball/top, stone/taş and eyebrow/kaş" should be displayed. These words encourage children to practice writing by copying, and their simplicity aids in early literacy development.

Fifth wall: The ceiling as a learning canvas

The ceiling, an often neglected space in classroom design, is transformed into an educational tool by featuring a large political map of the country (see Figure 4). Each city on the map is marked with a letter, hanging from a rope and overlapping the relevant city on the map. This setup serves several educational purposes:

- Enhancing Geographical Knowledge: By introducing cities through documentaries and discussions, children begin to understand and familiarize themselves with different places within their country. This method helps them connect learning with real-world locations, making the learning process more tangible and meaningful.
- Developing Focus and Attention: The movement of the letters on the ceiling initially captures the children's attention, but over time, as this becomes a familiar sight, it aids in improving their ability to focus and concentrate.
- Contextual Learning: The inclusion of written and illustrated posters related to different geographical contexts (such as seas and cities) in the remaining spaces on the ceiling provides additional learning material, reinforcing the connection between text, images, and real-world knowledge.

Sixth wall: The floor as an interactive element

The floor of the classroom, designated as the 'sixth wall', is utilized creatively to enhance learning and organization:

- Personalized seating plan: The floor features a seating plan with posters containing the names and pictures of the students. This personalized approach not only helps in organizing the classroom but also aids in name recognition and literacy for young learners.
- Inclusion of common names: For students with less common names, the floor can also display posters of individuals with common names who have made significant contributions to humanity. This approach broadens the students' exposure to different names while also introducing them to historical or contemporary figures.

- Evolving learning environment: As students' progress in their reading and writing skills, the images and texts on the floor can be altered or removed. This change reflects their growing proficiency and adapts to their evolving educational needs.



Figure 4: Shows the political map with city initials hanging, providing a visual representation of how geography can be integrated into the classroom environment.

The design of these last two walls (ceiling and floor) exemplifies the innovative use of classroom space to create an immersive and comprehensive learning environment that goes beyond traditional teaching methods. By engaging students in various ways and making every part of the classroom a learning tool, this approach fosters a deeper and more interactive educational experience.

Six-Sided Cubes from Six-Walled Classroom Supports Reading and Writing: Integrating Multi-Sensory Learning Tools in Literacy Education

The concept of a six-sided learning environment in the classroom is further enhanced with the introduction of multi-sensory letter cubes. These cubes are an integral part of this innovative literacy education approach, serving to strengthen the connection between physical interaction and learning. The detailed consideration of these cubes, as evidenced by the research and feedback from teachers and students, highlights their effectiveness in supporting reading and writing skills. In addition to seeing pictures of objects, plants and animals related to reading on the right, left, front, back, above and below, there should be cubes that students can examine with their hands and eyes, play with and help each other. The ordering of the cubes is a writing exercise. Children's playing with letters and words in support of the official program (Figure 5), writing on the walls, and recognizing the sound in the cube while writing require constant transitions from letter to word and word to letter. There are two dimensions preserved in these transitions; meaningfulness (both the picture of the letter on the cubes and the name of the object written on the wall are meaningful) and cooperation (students can study dozens of words on the wall and in the cubes in any order they wish).

Tiny-Research (1): How should the cubes be?

For five years, the cubes (Figure 6) prepared by the senior class teacher candidates (223 people) with voluntary participation were gifted to first grade students in different schools, unstructured observations were made about the students' interaction with the cubes, and the opinions of the teachers (8 people) were requested in writing. As a result of these researches, it has been revealed that letter cubes are interesting, instructive and usable.



Figure 5. First graders playing with cubes.



Figure 6. Representation of some surfaces of the cubes examined.

a. The role of letter cubes in the classroom:

- Multi-dimensional learning: The cubes allow for a hands-on, tactile experience, where students can physically manipulate letters, aiding in the comprehension and memorization of alphabets and words.
- Bridging Physical and Visual Learning: The constant transition between letter and word, and word to letter, with the cubes and wall writings, creates a dynamic learning environment that caters to different learning styles.

b. Research findings and recommendations for cube design (see Figure 6):

- Durability and material: Cubes should be constructed from hard, durable materials.
- Tactile features: Incorporation of embossed letters and Braille, catering to a diverse range of learners.
- Size variability: Availability of cubes in different sizes ensures ease of handling and engagement for various activities.

- Color coding and contrast: Using contrasting colors and grouping letters by sound categories enhance visual learning and recognition.
- Interactive elements: Adding features like QR codes or images of notable individuals can make the cubes more engaging and informative.
- Clear orientation: Cubes should have an obvious direction of handling, suitable for young learners.
- Age and psychology appropriateness: The design should be considerate of the children's age and psychological development.

c. Enhanced engagement through large-sized cubes:

- Seating alternative: Cubes large enough to sit on can replace traditional seating, creating a unique and interactive classroom environment.

d. Alignment with classroom and reading materials:

- Integration with wall elements: The cubes should correspond with the pictures, objects, plants, animals, cities, and names displayed on the walls of the classroom.
- Familiarity in learning materials: The first books that children read should include elements familiar to them from the walls and cubes, aiding in recognition and understanding.

e. Special consideration for diverse learning needs:

- Inclusive design: Especially for students with intellectual disabilities, it's crucial to choose learning materials and subjects that are familiar and concrete. This approach aligns with Akdağ's (2019) recommendation for inclusive education.

The implementation of these letter cubes in a six-walled classroom environment demonstrates a commitment to a multi-sensory, inclusive, and engaging approach to literacy education. This methodology not only supports traditional learning but also adapts to the diverse needs of students, making it a versatile and effective tool in early education settings.

Enhancing Literacy through Interactive Notebooks and Wall-Cube Dynamics

The innovative approach to literacy education in this six-sided classroom model is further enriched by introducing interactive notebooks. These notebooks are designed to bridge the gap between the larger-than-life walls and the smaller, manipulatable cubes, creating a cohesive learning experience for students. Students who interact with the class that is bigger than them and the cubes that are smaller than them need a notebook that will allow these two elements to interact over time (Figure 7). Notebooks should not be in the classical sense. Research is also required on how the notebooks in which the interaction between the walls and the surfaces of the cube will take place should be.

Tiny-Research (2): What should the notebooks be like to ensure the interaction between the walls and the surfaces of the cube?

A three-year study was conducted with prospective classroom teachers, with the voluntary participation of seniors, on what kind of notebook should be designed for students who will learn to read and write. In the study, 78 prospective teachers were first asked how the notebook should be, and the suggestions were evaluated, voted on and developed by 54 prospective teachers the following year. As a result of this predominantly qualitative study, it was decided to include studies related to the concepts in life on walls and cubes, with a checkered notebook on one side and the letter written at the beginning, middle and end on the other side (Figure 8).

a. Conceptualizing interactive notebooks (see Figure 7):

- Beyond traditional notebooks: These notebooks are not just for writing; they are a medium for integrating the experiences and learnings from the walls and cubes.
- Research-driven design: A study involving prospective classroom teachers has played a crucial role in shaping the format and content of these notebooks.

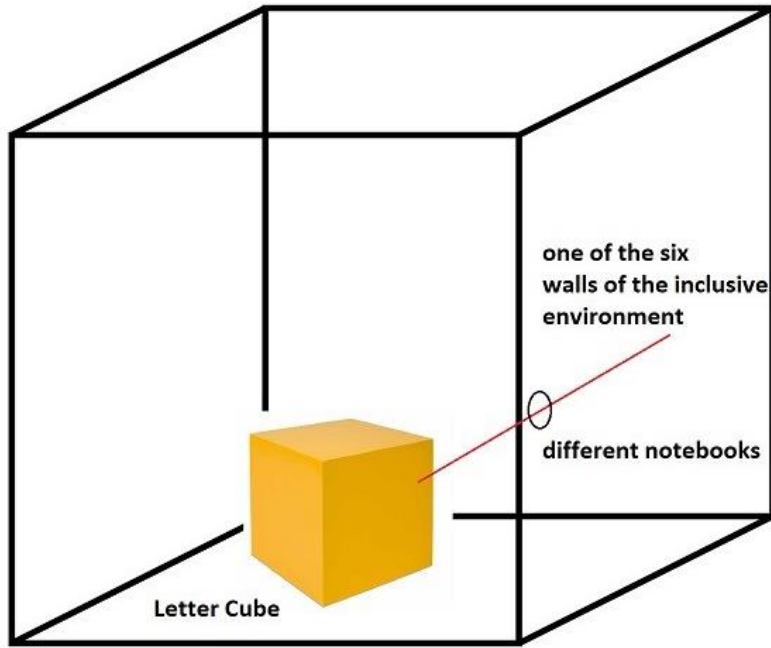


Figure 7. Different notebooks that will enable the interaction of walls and cubes.



Figure 8. Letters, related shapes and examples of writing the letter in different positions (The front pages and back pages of the notebook should be checked).

b. Features of the proposed notebooks (see Figure 8):

- Dual-format pages: One side of the page features a checkered layout for structured writing and drawing, while the other side displays letters in various positions, reinforcing letter recognition and formation.
- Content integration: The notebooks include elements related to the concepts depicted on the walls and the cubes, ensuring consistency in the learning environment.

c. Innovative writing exercises:

- Engaging and diverse activities: A range of unusual writing exercises is suggested to make the learning process more engaging. These include writing with various materials like flour, salt, rice, sugar, and even using tools like paint, beans, matchsticks, and wires.
- Sensory experiences: These activities are designed to stimulate different senses, making the learning process more holistic and enjoyable.
- Soil writing and air writing: More unconventional methods like writing in soil with a holey bottle or practicing letters in the air are proposed, although the latter might lack direct feedback.

d. Purpose of interactive notebooks in literacy education:

- Enhancing reading and writing fun: The goal is to make the process of learning to read and write more enjoyable and less monotonous.
- Knowledge transfer: By using a variety of tools and methods, these notebooks facilitate better knowledge retention and understanding.

e. Integrating notebooks with classroom dynamics:

- Linking Wall and Cube Learnings: The notebooks act as a tangible link between the large-scale learning from the walls and the hands-on experience with the cubes.
- Continuous Learning Loop: Students can take their experiences from interacting with the walls and cubes and reflect them in their notebooks, creating a continuous cycle of learning and reinforcement.

This approach to integrating interactive notebooks into a multi-sensory, six-sided classroom setting represents a significant leap in early literacy education. By connecting the physical and visual aspects of learning with tactile and creative writing experiences, these notebooks serve as a key tool in fostering a deep and lasting understanding of reading and writing. While having multiple pages for all letters and compiling these pages into a book appears as a notebook close to the classical notebook, unusual writing exercises have also been suggested. Suggestions for these extraordinary writing exercises (from high scoring to low scoring); printing with flour, salt, rice and sugar, sand bucket, working with dough, sticking a matchstick on foam, working with paint, working with beans, sticks and stones, working with a lid or button, twisting wires, using a lid filled with water and working on the soil with a holey plastic bottle, writing in the air (not recommended as no feedback can be given). Apart from the notebook that we propose to redesign, these types of writing tools aim to improve the fun of reading and writing and the ability to transfer knowledge.

Special and Integrated Education: Paradigms and Challenges

Special education and inclusive education represent two important approaches that education systems adopt towards students with different needs. Special education generally provides a learning environment specifically tailored to individual students with learning disabilities, hearing impairments, intellectual disabilities, sensory impairments, or other special needs (Sarıkaya & Uzuner, 2013). These students may often have difficulty meeting their needs in traditional classrooms. Inclusive education, on the other hand, encourages students to learn in the same classrooms with the majority of students and integrates students with special needs into the general education environment. The main difference is that in special education, students are generally educated in separate classes, while in integrated education, students with special needs are included in general education classes, providing greater social and academic integration. If all the students are visually impaired, for example, it is special education provided even if the class is crowded; for an inclusive environment, sitting next to each other is not enough; sighted and blind

students must strive together for the same goal (Bülbül, 2011). The concepts of special education and inclusive education are pivotal in addressing the diverse needs of students.

Special education: Customized for individuals with disabilities (learning, hearing, intellectual, sensory, etc.), often in separate settings.

Inclusive education: Integrates students with special needs into general classrooms, promoting a unified learning environment.

While special education focuses on tailored learning environments for students with specific needs, inclusive education integrates these students into general classrooms, aiming for social and academic inclusivity.

Paradigms in inclusive education (Dynamic learning environments in inclusive education)

We can examine the people in the classroom on two bases; students and teacher. Different paradigms apply in inclusive education depending on whether these two groups are disabled or not. If we consider blindness as a disability, the situation where the teacher and the student do not have vision problems does not belong in the inclusive environment. Since no one in this class has a vision problem, this situation should not be included in the paradigms of inclusive education, but it would be a very useful approach for teachers and students to act as if a visually impaired person were in the classroom. For example; what is happening in the classroom will be constantly described on the board, and the tactile nature of the lesson will contribute to learning by using more senses. If the student is visually impaired but the teacher is sighted, the teacher can support the student and make an effort to teach the student his experience, knowledge and skills. This second paradigm is more difficult than the first. The third paradigm is more difficult than the first two paradigms because here it is the teacher who is visually impaired, not the student. There are issues where students need to support the teacher, and until adaptation is achieved, learning losses are inevitable. The last paradigm is the most difficult. In this paradigm, both the student and the teacher are visually impaired. If the other students in the class are visually impaired, it starts to take a long time to find a solution, such as when a material falls on the floor and cannot be found. All paradigms are listed according to their difficulty level, but the difficulty levels of these paradigms do not always remain the same as at the beginning. As long as the parties try to communicate sincerely, even the most difficult paradigms can create effective learning environments.

The paradigms of inclusive education can be understood by examining the disability status of students and teachers. Different scenarios present varying challenges:

Scenario 1: Neither student nor teacher is visually impaired: Although not a traditional inclusive setting, adopting practices as if a visually impaired person were present (e.g., detailed verbal descriptions, tactile teaching methods) can enhance learning for all.

Scenario 2: Visually impaired student, sighted teacher: The teacher supports the student, adapting teaching methods to include tactile and auditory elements. This scenario demands significant effort from the teacher for effective learning.

Scenario 3: Visually impaired teacher, sighted students: Here, students may need to assist the teacher. This reversal of roles can lead to initial learning losses but can also foster empathy and adaptability.

Scenario 4: Both student and teacher are visually impaired: The most challenging scenario, where both parties face similar limitations. Simple tasks may become complicated, but it can also lead to innovative problem-solving and deeper understanding.

Adaptability and communication: The effectiveness of any inclusive setting largely depends on the willingness to communicate and adapt. Over time, even the most challenging scenarios can evolve into effective learning environments.

Tailored strategies: Depending on the scenario, different strategies and tools (e.g., Braille materials, audio descriptions, tactile learning aids) are essential.

Empathy and understanding: Inclusive education not only addresses academic needs but also fosters empathy, understanding, and respect for differences among all students.

Inclusive education is a dynamic and complex field, requiring a deep understanding of various disabilities and a commitment to adapt teaching methods. While challenges exist, particularly in more complex scenarios, the potential for creating a rich, empathetic, and diverse learning environment is significant. The goal is to ensure that all students, regardless of their abilities or disabilities, have equal opportunities to learn and succeed.

Tiny-Research (3): What should be taken into consideration when teaching barrier-free reading and writing?

Two situations have a serious impact on teaching reading and writing to the visually impaired (Aslan, Doğuş & Şafak, 2022). The first of these is the visual status of the visually impaired student (is he totally blind or partially sighted?) and the other is when the visual impairment has been valid (was he born blind or did he become blind later?). According to the experiences gained during teaching reading and writing with the Braille alphabet to a secondary school student who later became visually impaired and partially sighted, but is known to be completely blind in the future, and the information in the literature, it is of great importance for the instructor to be aware of individual differences. Students with low vision should be taught to read and write in large font and should not be forced to learn the Braille alphabet, but children who are totally blind from birth should be treated with Braille typewriters and Braille tablets, similar to the formal approaches used for sighted children. Students who are visually impaired and can read should focus on the Braille alphabet (Figure 9).

A total of 10 days were spent for the successful Braille teaching study with the child with low vision. Each study took two hours in total. The work started by working with cardboard prepared in embossed form. The letters learned from the beginning are repeated and new letters are practiced with the help of a specially designed box where all the letters can be shown. In the meantime, writing exercises are carried out with the learned letters such as "baba". Work is carried out using both cardboard and boxes together.

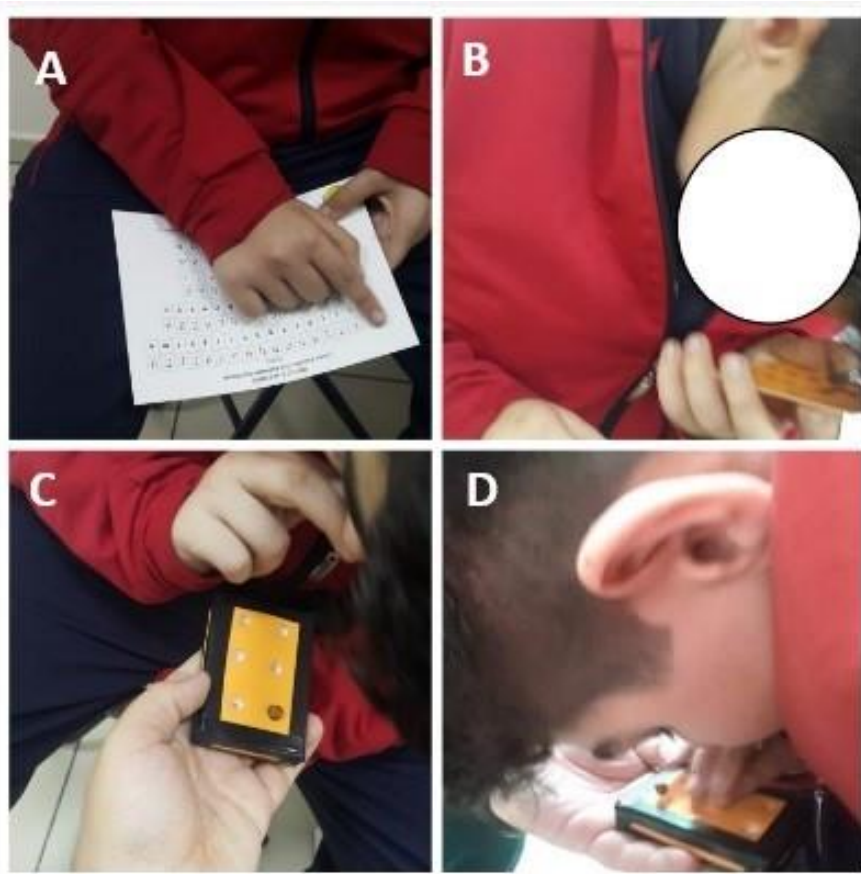


Figure 9. Student's recognition of letters from Braille alphabet cardboard (A), Use of the changeable box that introduces six points and is developed in hand sizes (B, C and D).

The game cube was redesigned for the fingertips that the student does not use for reading purposes and whose sensitivity needs to be increased (Figure 10). It has been observed that the sensitivity of the tips of the fingers and different points has improved while playing with the toy, which would be considered sufficient to complete only one surface.



Figure 10. Embossed fingers used to increase finger sensitivity and colored game cube (A and B).

The teaching of reading and writing to visually impaired students requires an understanding of their unique needs, which can vary significantly based on their level of visual impairment and when it occurred. This research, focusing on the instruction of Braille reading and writing, highlights key considerations

a. Understanding individual differences:

- Visual status: Assess whether the student is totally blind or partially sighted. This assessment will guide the choice of instructional methods and tools.
- Onset of Visual Impairment: Determine if the student was born blind or became visually impaired later. This information impacts how they might best learn new or adapted reading and writing skills.

b. Instructional approaches:

- For partially sighted students: Utilize large font materials and gradually introduce them to Braille. Avoid forcing Braille learning if it's not immediately necessary.
- For totally blind students: Employ Braille typewriters and tablets from the beginning, mirroring the formal education methods used for sighted children.
- For students transitioning to braille: Focus on the Braille alphabet, ensuring the learning process is engaging and interactive.

c. Practical teaching strategies:

- Use of embossed cardboard and boxes: Start with tactile learning tools like embossed cardboard to introduce letters. Progress to more complex tools such as changeable boxes displaying different letters.
- Incorporating repetition and new learning: Repeat previously learned letters while introducing new ones to reinforce learning.
- Combining different Tactile Tools: Use both cardboard and boxes in tandem to provide a varied tactile experience.
- Practical writing exercises: Implement exercises like writing simple words to practice newly learned letters.

d. Enhancing finger sensitivity:

- Redesigned game cube: Develop tactile games, such as a textured cube, to improve finger sensitivity, particularly for unused fingertips. These activities can be both educational and enjoyable.

e. Some of other tiny-research outcomes (Figure 9 and 10):

- Figure 9: Shows the student's interaction with the Braille alphabet through embossed cardboard and a changeable box, emphasizing the tactile learning process.

- Figure 10: Illustrates the embossed fingers and colored game cube used to increase finger sensitivity and engagement.

Effective teaching of reading and writing to visually impaired students requires tailored approaches that respect their individual differences and learning histories. Tactile tools, repetitive practice, and engaging activities are crucial in this learning process. The goal is to develop a comfortable and efficient learning environment that fosters both skill acquisition and a positive attitude towards learning.

Conclusion and Discussion

The effective instruction of literacy demands meticulous planning that is deeply rooted in the individual characteristics and needs of children. Given the inherent diversity in learning styles among children, educational programs must be designed with acute sensitivity to their age, interests, and learning preferences (Güneş, 2013). Recognizing that some children may lean towards visual learning methods while others may respond more favorably to auditory or tactile experiences, the planning stage becomes crucial. Careful selection of materials and methods that enhance the effectiveness and enjoyment of learning is paramount, accounting for the unique interests and strengths of each child. This approach not only fosters increased engagement and active participation in the learning process but also empowers each child to harness their potential to the fullest extent (Gültekin & Aktay, 2014). In this context, the adoption of a flexible and personalized teaching model emerges as a motivating force for children in the literacy process, instilling a positive attitude towards learning.

To ensure the efficacy of methods employed in teaching reading and writing, the implementation of strategic approaches such as the sound-based sentence method or sound combining method is imperative (Güneş, 2013). These methodologies systematically guide students through the acquisition of grammar and literacy skills, offering a step-by-step learning trajectory. The sound-based sentence method initiates the process by equipping students with the skills to recognize and distinguish sounds. Subsequently, it progresses through stages encompassing sound combination, syllable formation, word recognition, and culminates in understanding and constructing sentences (Sağırılı & Atik, 2022). On the other hand, the sound combining method underscores word formation through the amalgamation of sounds, furnishing students with a robust foundation for comprehending grammar rules and expressing themselves in writing. These methodologies afford students the opportunity to incrementally comprehend and internalize the intricacies of the reading and writing processes. Beyond bolstering language skills, audio-centric teaching significantly contributes to the development of fundamental abilities necessary for understanding and producing meaningful texts (Sağırılı & Atik, 2022)."

In the realm of literacy education, the simultaneous and coordinated development of reading and writing skills holds paramount significance. This integrative approach plays a pivotal role in equipping children with the ability to comprehend what they read and effectively structure their written expressions (Sağırılı & Atik, 2022). The acquisition of vocabulary and language structures during reading serves as the foundation for honing writing skills, while writing practices reciprocally reinforce reading comprehension (Erbaş, 2021). This reciprocal process facilitates enhanced analysis of textual content, the establishment of connections between different texts, and a profound understanding of text structures (Güneş, 2013). Concurrently, engagement in writing exercises contributes to the refinement of students' abilities in articulating thoughts, organizing arguments, and revising written statements. This bidirectional approach ensures a more comprehensive and profound acquisition of reading and writing skills, with each skill set complementing and enriching the other. Consequently, students not only become adept at understanding texts but also at effectively expressing their own thoughts in writing (Güneş, 2013).

Adhering to the principle of diversity in literacy education planning proves instrumental in fostering more effective and comprehensive language skill development among students (Güneş, 2013). Significantly, the incorporation of various text types and materials, including fairy tales, stories, nursery rhymes, poems, and songs, into the educational process becomes crucial. Each text genre provides students with unique opportunities to explore diverse facets of language and its utilization. Fairy tales and stories, for instance, stimulate imagination and enhance reading comprehension by presenting intricate characters and plots (Güneş, 2013). Nursery rhymes and poems, with their focus on rhythmic and aesthetic language elements, contribute to vocabulary expansion and heightened sound awareness. The inclusion of songs transforms language learning into an engaging and interactive activity. Concurrently, listening training studies emerge as an integral component of this multifaceted process, enhancing students' fundamental language skills such as auditory comprehension, extraction of main ideas, and sound discrimination (Erbaş, 2021). This diversified approach not only cultivates reading and writing skills but also fosters critical thinking and creative expression capabilities among students. Thus, the incorporation of diverse text types and activities within literacy education transforms students' language learning into a more comprehensive and enriching experience (Erbaş, 2021).

In the instruction of reading and writing, special emphasis should be placed on the development of children's fine motor skills. Within this scope, activities that strengthen finger, hand, and arm muscles, such as coloring and line drawing exercises, should be considered an integral part of the learning process (Başal & Batu, 2002). These activities not only enhance children's abilities to hold and control a pencil but also fortify hand-eye coordination and fine motor skills in preparation for writing (Güneş, 2013). Coloring activities provide children with opportunities to play with colors, learn to stay within boundaries, and express their creativity. Line exercises, involving drawing straight, curved, or wavy lines, encourage children to use their hand and finger movements in a coordinated manner, thereby improving these skills. Additionally, these activities have positive effects on crucial abilities such as focusing attention and developing visual perception. Thus, coloring and line drawing exercises play a critical role in reading and writing instruction, aiding in the development of both motor skills and writing abilities in children (Başal & Batu, 2002).

To maximize children's success in reading and writing instruction, it is essential to consider their individual differences, learning styles, and pace of learning (Gültekin & Aktay, 2014). Each child is unique, and their learning journeys vary. While some children learn better with visual materials, others may achieve more effective results with auditory or kinesthetic methods. Therefore, employing various teaching strategies and materials to facilitate learning in the most suitable way for each student is important. Given that every child has a different pace of learning, being patient and allowing them to progress at their own speed without pressure is crucial (Başal & Batu, 2002). This individualized approach ensures that students feel more comfortable, boosts their motivation towards learning, and ultimately leads to the development of reading and writing skills on a more solid foundation. Providing a learning environment that caters to the individual characteristics of students is fundamental in reading and writing education, as it fosters the development of their self-confidence and independent learning abilities (van Kraayenoord, 2007).

In the domain of reading and writing instruction, a fundamental aspect of the learning process is the continuous monitoring of children's development, coupled with providing them with regular feedback and acknowledging their achievements. Close observation of each child's progress allows educators to discern the areas where students excel and identify those where additional support is required (Gültekin & Aktay, 2014). Regular feedback is instrumental in offering children a clear understanding of their learning journey, highlighting their strengths and areas needing improvement. This approach not only makes students feel valued but also significantly boosts their motivation. Furthermore, acknowledging and celebrating children's accomplishments sustains their interest and enthusiasm in the learning process. Rewards, rather than being materialistic, can take the form of positive verbal affirmations, special responsibilities within the classroom, or activities tailored to their interests (Gültekin & Aktay, 2014). These forms of recognition reinforce in children a sense of value and significance in their literacy development efforts. Consequently, a systematic approach of tracking progress, providing feedback, and offering rewards fosters a supportive, secure, and motivating environment in literacy education, thereby enhancing the overall learning experience of the students (Gültekin & Aktay, 2014). In learning to read and write, encountering difficulties such as the misrecognition of sounds, syllables, words, and sentences is a typical and natural aspect of the educational journey (Sağırılı & Atik, 2022). As students progress from grappling with the foundational elements of language, like sounds and syllables, to the more complex structures of words and sentences, they may face various challenges. Addressing these challenges necessitates patience, understanding, and individualized support from educators. When students make errors in reading or writing, it is crucial for teachers to provide clear, constructive feedback and suggest strategies to rectify these mistakes (Gültekin & Aktay, 2014). Moreover, reinforcing these fundamental literacy skills through additional

practice and repetition can significantly contribute to laying a robust foundation for the literacy learning process. Adopting this supportive approach is instrumental in bolstering students' confidence and effectively enhancing their literacy skills (Sağırılı & Atik, 2022).

In the realm of reading and writing education, especially among younger students, common issues include beginning sentences with lowercase letters and the incorrect or absent use of punctuation marks (Gültekin & Aktay, 2014). This challenge often arises as part of developing children's written communication skills and warrants specific attention. Understanding and adhering to the language's spelling conventions are critical components of the literacy process, forming the foundation of written expression (Sağırılı & Atik, 2022). Initiating sentences with capital letters and accurately placing punctuation marks enhance both the clarity and readability of the text. Therefore, instructing students in these fundamental spelling principles and providing ample practice opportunities is essential for effective and precise written communication. Educators should adopt a patient stance towards such errors, encouraging the use of correct spelling conventions and facilitating practice opportunities. Implementing exercises, repetition, and personalized feedback can help students rectify these mistakes, progressively refining their written expression and bolstering their linguistic proficiency. In this context, equipping students with the necessary resources and support to comprehend and amend their errors is a crucial step in the advancement of their written expression skills (Sağırılı & Atik, 2022).

Another prevalent issue in literacy education, particularly evident in children who are newcomers to reading and writing, is the tendency to leave excessive space between words and to start writing from incorrect positions on the line. These writing habits may stem from the fact that children's visual-spatial skills and hand-eye coordination are still in the developmental stages (Sağırılı & Atik, 2022). Grasping and applying the fundamental principles of writing sequence is an important facet of the literacy journey. Educating students on how to properly align text, maintain appropriate spacing between words, and correctly use lines can lead to the creation of texts that are not only legible but also visually organized (Sağırılı & Atik, 2022). To address these challenges, it is beneficial for educators to guide students through writing exercises and utilize tools such as writing templates or lined papers. Moreover, instilling in students the habit of reviewing and revising their own written work aids in enhancing their writing skills. Providing consistent feedback and practice helps to gradually improve these fundamental writing competencies, thereby encouraging children to write more legibly and coherently. Throughout this process, the patient and understanding demeanor of teachers plays a crucial role, creating a comfortable and supportive environment that boosts students' motivation to learn.

Another common difficulty in literacy education is students' use of words that disrupt the coherence of meaning or the inclusion of unnecessary words, along with not adhering to sentence structure rules. These issues are particularly evident in children who are beginning to learn the structural and semantic norms of language. It is vital for students to accurately and effectively utilize words and sentence structures to convey their thoughts in a clear and comprehensible manner (Sağırılı & Atik, 2022). The employment of superfluous words that detract from the meaning's coherence can adversely affect the text's flow and the reader's comprehension. Similarly, not following sentence structure rules can compromise the text's clarity and consistency.

To address these spelling and writing issues, it is essential for educators to provide guidance in sentence construction and word selection. Encouraging students to thoroughly review and revise their texts aids in enhancing their writing and expressive abilities (Ferah, 2009). Through various activities and exercises, students learn to formulate sentences that are logically structured and maintain semantic coherence. Classroom discussions and peer reviews of their writings also offer students a platform to critically assess and refine their writing skills. In this phase, supplying necessary feedback for students to recognize and rectify their errors helps in the gradual advancement of their language competencies. The patient and supportive approach of teachers is pivotal in this context, significantly bolstering students' self-assurance and writing prowess (Başar & Gürbüz, 2020).

One of the principal challenges encountered by students in the process of learning to read and write is their difficulty in comprehending texts or articulating their understanding, as well as their inability to edit or correct what they have written. These issues are a natural aspect of the learning trajectory and mirror the developmental stages of students' language abilities (Ferah, 2009). Reading comprehension difficulties arise when students are unable to grasp the meaning of a text, despite being able to read it. This could be attributed to several factors, such as the text's complexity, limitations in the student's vocabulary, or a lack of effective reading comprehension strategies. Similarly, the inability to elucidate their understanding refers to students' challenges in explaining or summarizing the text in their own words (Başar & Gürbüz, 2020).

The challenge of being unable to edit or correct written content is linked to students' deficiencies in reviewing their texts and implementing necessary corrections (Başar & Gürbüz, 2020). This issue is particularly noticeable in younger students whose skills in text editing and revision are still in the developmental stage. To foster the development of these skills, teachers play a crucial role in offering guidance and practice opportunities related to reading comprehension strategies and text editing techniques (Tiryaki, 2016). For students facing challenges in understanding while reading, activities such as identifying the main idea and details of texts and deciphering word meanings in context can be implemented (Ferah, 2009). In the writing process, instructing students on stages like drafting, reviewing, and editing their texts contributes to the creation of more effective and organized written pieces. Positive feedback and correction suggestions provided during this process encourage students to feel more confident and enhance their language skills (Başar & Gürbüz, 2020).

The integration of computers into the teaching of reading and writing holds a significant role in contemporary education. The swift advancement of computer technology offers students more effective and interactive learning opportunities. Computer-assisted instruction brings forth various advantages, particularly in the enhancement of literacy skills (Tiryaki, 2016). Computers play a pivotal role in enhancing students' text comprehension skills by providing access to interactive reading materials. Educational software offers resources such as audio books, interactive stories, and student interactive games, providing students with opportunities to expand their vocabulary and engage with texts (Başar & Gürbüz, 2020). Furthermore, computers enable students to practice creating and editing their own writing. Word processing and spelling tools contribute to improving spelling skills and enhancing the organization of written content (Tiryaki, 2016). One of the significant advantages of computer-based learning is the provision of customized educational experiences for students (Tiryaki, 2016). Tailored software that aligns with individual needs allows students to progress at their own pace and identify their strengths and weaknesses, thereby facilitating more effective improvement of literacy skills (Tiryaki, 2016). However, realizing these benefits requires a balanced and effective integration of technology. Teachers need to meticulously select computer-based learning tools and provide guidance to students (Gökalp & Erdoğan, 2023). Additionally, addressing disparities in access to technology and ensuring the sustainable integration of computer-based learning tools are essential considerations (Tiryaki, 2016).

The choice of materials for teaching reading and writing significantly influences students' learning processes, enhancing their interest and attention (Gökalp & Erdoğan, 2023). In today's educational landscape, technology has provided valuable opportunities, with computer-aided teaching materials like smart boards, video content, and PowerPoint presentations playing a pivotal role in this context. Smart boards, through their interactive features, make lessons more engaging and dynamic, while video content captures students' curiosity with visual and audio elements, making subjects more comprehensible (Tiryaki, 2016). PowerPoint presentations offer teachers a platform to deliver lessons in an organized and visually compelling manner (Gökalp & Erdoğan, 2023).

These materials contribute to diversifying and reinforcing the learning process, catering to both visual and auditory learning styles, particularly in the acquisition of reading and writing skills (Gökalp & Erdoğan, 2023). For instance, presenting a story or poem in video format can aid students in better understanding the text and retaining the content more effectively. Similarly, engaging in interactive activities on smart boards enhances student participation in classes and provides opportunities for practical application of acquired knowledge (Gökalp & Erdoğan, 2023).

The effective utilization of these materials not only heightens students' interest and motivation in the reading and writing process but also renders their learning experiences more meaningful and enduring (Gökalp & Erdoğan, 2023). Integrating these materials into lesson plans allows teachers to address diverse learning needs and foster a more inclusive educational environment. Consequently, the strategic and creative incorporation of computer-assisted teaching materials in teaching reading and writing has become an essential approach in contemporary education (Gökalp & Erdoğan, 2023).

The integration of traditional teaching materials in literacy education plays a crucial role in facilitating students' acquisition and development of reading and writing skills. In an era where technology-based tools are increasingly prevalent, the enduring value of classic resources such as blackboards, pencils, erasers, paper, books, magazines, newspapers, and brochures cannot be overlooked. These materials form the foundation of the reading and writing processes and offer tangible means for students to practice and refine these essential skills (Gökalp & Erdoğan, 2023).

The blackboard remains a fundamental tool in the classroom, enabling teachers to visually present information and concepts. This visual aid is vital for students to follow and understand lessons more effectively. Pencils and paper provide the most direct medium for writing practice, allowing students to physically engage in the act of writing. This

engagement not only improves writing skills but also enhances hand-eye coordination and fine motor skills, which are critical in early education (Gökalp & Erdoğan, 2023). Moreover, books, magazines, newspapers, and brochures offer a rich variety of reading materials. They expose students to different text types, genres, and writing styles, thus encouraging the development of diverse reading habits. Interacting with such a wide range of texts aids students in understanding different perspectives and content, enhancing their ability to comprehend and interpret information. In using these traditional materials, students engage deeply with the reading and writing processes. During reading, they employ critical thinking skills, such as interpreting meaning and making inferences, which are vital for comprehension. In writing, they learn to organize and express their thoughts clearly, adhering to spelling and grammar rules. This practice in structuring and editing their writing is crucial for their overall literacy development.

The balance between traditional materials and modern technology in literacy education is essential. While technology offers interactive and engaging ways to learn, traditional materials provide the fundamental, hands-on experience necessary for mastering reading and writing skills. Teachers' ability to blend these resources effectively can create a more dynamic, comprehensive, and accessible learning environment for students (Gökalp & Erdoğan, 2023).

The acquisition of reading and writing skills is particularly crucial for visually impaired individuals, as it significantly contributes to their independence and self-confidence (Sosun, Sosun & Özdemir, 2011). Effective teaching methods tailored to their needs, such as the sound-based sentence method and sound combining method, play a vital role in this educational process (Ünal & Coşkun, 2019). These methods focus on teaching students to recognize and combine sounds into syllables, words, and eventually, coherent sentences. Such a progressive approach helps visually impaired students grasp the structure of the language and understand the relationships between words more effectively (Şahin, Aydın, Sevim & Çigdem, 2011; Gökalp & Erdoğan, 2023).

The Braille writing system is an indispensable tool in this context. Developed specifically for the visually impaired, it enables reading and writing through a tactile format. Braille consists of patterns of raised dots representing letters, numbers, and even musical notation. This system empowers visually impaired students by providing them with the means to read and write independently, thereby greatly enhancing their academic and personal development (Sosun, Sosun & Özdemir, 2011; Ünal & Coşkun, 2019).

Braille's contribution to literacy for the visually impaired cannot be overstated. It not only facilitates access to written language but also fosters a sense of autonomy and self-reliance in learners. By enabling visually impaired students to engage with text-based information, Braille opens up a world of knowledge and opportunity, aligning with broader educational and societal goals of inclusion and accessibility. Moreover, the integration of Braille with digital technology has further expanded possibilities for visually impaired learners. Digital Braille displays and screen readers have made a variety of electronic texts accessible, enhancing the educational resources available to these students. This technological evolution ensures that visually impaired individuals can participate more fully in a digitally connected world. In essence, the strategic use of specialized teaching methods and tools like the Braille system underscores the commitment to providing a comprehensive, inclusive education for all students, regardless of their visual abilities. This approach not only nurtures literacy skills but also supports the overall empowerment and integration of visually impaired individuals into society (Ünal & Coşkun, 2019).

The education of visually impaired students, including those with low vision, demands a multifaceted approach that accommodates their unique learning needs. For students with low vision, the sighted writing system, which employs special tools like magnifying glasses, telescopes, and screen readers, is instrumental in facilitating their literacy development (Sosun, Sosun & Özdemir, 2011). These tools enable them to utilize their residual vision effectively, allowing them to engage with texts visually (Ünal & Coşkun, 2019).

The success of both the Braille system for completely blind students and the sighted writing system for those with low vision is crucial. These systems provide visually impaired students with equal educational opportunities, enhance their social participation, and support their independence (Şahin, Aydın, Sevim & Çigdem, 2011). The effective implementation of these systems in teaching reading and writing is vital for the educational success and societal integration of visually impaired students (Ünal & Coşkun, 2019).

When teaching reading and writing to these students, it is essential to focus on diversity and individualization (Şahin, Aydın, Sevim & Çigdem, 2011). Utilizing a variety of text types and teaching materials can enrich their learning experiences and bolster their language skills. Activities such as listening to fairy tales, stories, nursery rhymes, poems, and songs are particularly beneficial. They not only help students understand language structures and rhythmic elements but also stimulate their imagination and expose them to different linguistic styles (Ünal & Coşkun, 2019).

Incorporating both modern and traditional teaching tools enhances the learning experience for visually impaired students. While computer-aided tools offer innovative and interactive learning opportunities, traditional materials like blackboards, pencils, erasers, paper, books, magazines, newspapers, and brochures provide essential tactile and visual stimulation (Akdağ, 2019). Specially designed printed books and Braille materials are also crucial in supporting their reading development.

Overall, the approach to teaching visually impaired students should be holistic, combining various tools and methodologies to cater to their specific needs. This approach not only aids in developing their literacy skills but also plays a significant role in their overall cognitive and social development. By addressing their individual learning styles and needs, educators can empower visually impaired students to achieve their full educational and personal potential. However, when teaching reading and writing to visually impaired students, it is essential to take into account each student's individual differences, learning styles and learning speeds. Because each student has unique needs and preferences, teaching programs need to be flexible, individualized and aligned with students' interests. This approach increases students' motivation and provides them with the opportunity to discover the most suitable learning paths.

As a result, teaching literacy for visually impaired students requires a student-centered approach as well as diverse and flexible teaching materials. In this way, each student's learning potential is maximized and their academic success and social participation are supported. This diversity and individualization in the teaching process allows students to both improve their literacy skills and increase their ability to express themselves.

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