

Research Article

A study of teacher practices in supporting the information processing of children with intellectual disabilities

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Information processing in children with intellectual disabilities is crucial for understanding their cognitive development, recognizing their deficits in learning information and individualizing educational programs. The aim of this study was to explore the implementation experiences of special education teachers and elementary school teachers working with children with intellectual disabilities in relation to information processing, and to determine what kind of adaptations/regulations they have made to support information processing for these children. To this end, a generic design, one of the qualitative research designs, was used in the study. The study group comprised 61 teachers, including 32 special education teachers and 29 elementary school teachers. The data were collected using an interview technique and content analysis was used to analyze the data. The findings show that teachers working in both educational settings (special education teachers and elementary school teachers) have inadequate knowledge of information processing, and moreover, teachers in both groups do not make accommodations for information processing activities that are extremely important for children with intellectual disabilities. Therefore, teachers need to make pedagogical, physical and equipment-related accommodations to help improve the information processing work of children with intellectual disabilities.

Keywords: Information processing model; Instructional adaptation; Intellectual disability; Learning

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1. Introduction

Learning is a crucial factor in human development, significantly contributing to individuals' cognitive, emotional, and social growth. Through learning, individuals gain new experiences in their interactions with the environment (Alam, 2022). The experiences that individuals gain through learning support their individual development and enhance their adaptation to the social environment in which they live (Saracho, 2023). It should be noted that learning is a process that individuals experience and internalize continuously throughout their lives, and that this process plays a key role in the cognitive, emotional and social development of individuals. Therefore, learning, which is accepted as a product that emerges during this process (Lestiyawati, 2020),

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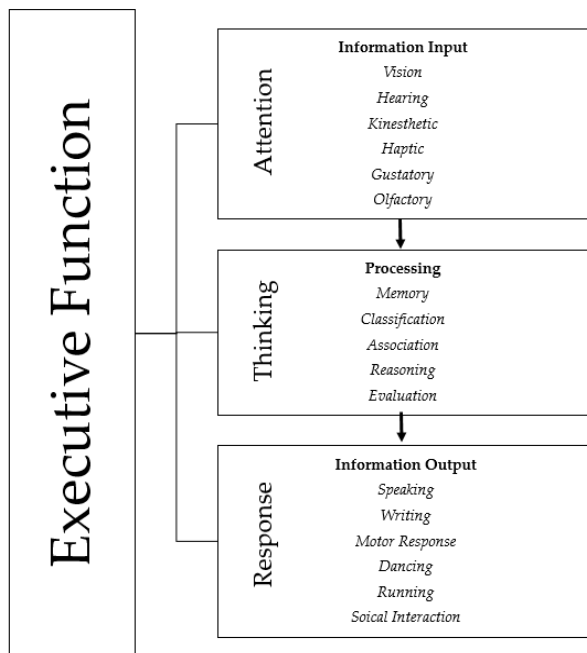
should be seen as the most important tool that enables the individual to survive. For this reason, learning is a form of behavior and reasoning that is of vital importance to the individual.

Learning is of vital importance for all children and is particularly crucial for children with intellectual disabilities. Children with intellectual disabilities are among the groups that exhibit significant performance deficits in many domains. Intellectual disability is a condition where symptoms surface before the age of 22, and individuals perform two standard deviations below the norm in intellectual functions, while experiencing limitations in adaptive behaviors (Schalock, 2021). In simpler terms, it is a disability that involves significant limitations in intellectual functions and adaptive behaviors, which can negatively impact cognitive, social, and practical adaptive skills (Kirk et al., 2022). Intellectual disability is a condition that affects individuals with special needs and is characterized by cognitive impairment. It has a negative impact on learning and limitations in various developmental domains, including social-emotional development and language-speech (Totsika, 2022). The significance of this issue is emphasized by the executive function of cognition and its role in individual survival.

Individuals with intellectual disability exhibit significant impairments in skills such as slow and challenging learning, attention, perception, memory, reading, writing, problem-solving, and arithmetic, and experience difficulty in generalizing their learned skills (Haegele & Park, 2016). The adverse impacts of intellectual disability on an individual's cognitive development also impede executive functions (England-Mason & Dewey, 2023; Vicari & Carlesimo, 2002). Individuals with developmental differences or disabilities exhibit variations in their information processing capabilities. Specifically, children with intellectual disabilities experience challenges in processing information while acquiring new knowledge or skills (Adams & Hitch, 2022). Essentially, they display significant limitations in their information processing abilities. The information processing model, as expounded by Wickens and Carswell (2021), describes the process that information undergoes until it manifests as a behavioral response. Relevant questions addressed by the model include how newly acquired information is received from external sources, how it is processed, how it is stored in long-term memory, and how the stored information is retrieved and retained. According to the information processing model, there exist two main features that contribute to learning. The sensory register is the area where the first auditory and visual stimuli arriving at the sensory organs from the external environment are stored. According to Eggen (2020), sensory memory provides about four seconds of storage for auditory information and about one second for visual information. Sensory memory has a large capacity and holds information for a very short period of time. Information that enters sensory memory through attention and perception is processed and transferred to the next memory, short-term memory. Many unprocessed auditory and visual sensations are deleted. Short-term memory stores a limited amount of information in a limited way. Information that can be encoded, grouped, and made meaningful is transferred to long-term memory and transformed into a behavioral response (Shevlin, 2020). The information processing model that explains the process of learning a knowledge or skill is shown in Figure 1.

The Information Processing Model is a theoretical framework used in cognitive psychology, which focuses on explaining the processes of receiving, organizing, understanding, and remembering information. By focusing on cognitive processes such as perception, attention, memory, reasoning, and language, the model allows understanding how individuals interact with their environment and how they process information. Thus, the model provides an important theoretical basis for gaining insights into the cognitive processes and the nature of learning in children. As shown in Figure 1 above, this model consists of three main processes: information input, processing, and information output. In the information input stage, information from the environment is perceived by directing attention to relevant stimuli. In the processing stage, this information is mentally processed, organized, interpreted, and transferred from short-term to long-term memory. Finally, in the output stage, the processed information is reflected in its

Figure 1
Information processing model (Kirk et al., 2022)



meaningful form as emotional and behavioral responses. This model helps us understand how individuals process information by describing intellectual processes and is used in the field of cognitive psychology to study information processing (Kirk et al., 2022).

Information processing is not only a phenomenon that describes the learning of knowledge or skills, but also an important action that is central to the performance of humans and many living organisms. Information processing describes the characteristic features of acquired human behavior, from perceiving the environment to acting on that environment (Wickens & Carswell, 2021). In this regard, information processing focuses on the consequences of the environment on human behavior and human behavior on the environment. In this context, information processing describes the processes of attention, perception, memory and cognition, action selection and multitasking performance, and the behavioral transformations of this process.

While children with intellectual disabilities have secondary limitations in sensory input areas such as vision, hearing, and touch due to limited attention and perceptual inconsistencies in information input from information processing processes, they have primary difficulties in information processing processes such as memory, classification, comprehension, evaluation, and integration (Kirk et al., 2022). These limitations in both knowledge input and knowledge processing naturally have a negative impact on knowledge output. In fact, knowledge processing is the *raison d'être* of the behavioral output we call learning. Therefore, the full realization of our learning and the use of what we have learned as a behavioral product depends on the smooth functioning of the individual's information processing processes (O'Mara et al., 2009). Therefore, in order for children with intellectual disabilities to permanently learn a knowledge or skill, their information processing processes must be supported. In this context, professionals (teachers, therapists, etc.) working with children with intellectual disabilities need to make some adaptations and adjustments in the information processing processes (information input, information processing, and information output) (Jacobs & Nader-Grosbois, 2020). Kirk et al. (2022), suggest that teachers should make accommodations to support information input based on all the senses, such as "audio books, manipulatives, videos, pictures, graphs, charts, storyboards, timelines, tactile graphics, and sound files. In addition, they emphasize that arrangements such as "kinesthetic activities, discussions, debates, games, drama, dance, music, singing, role playing, model making, stories, analogy games, problem solving, experimentation, and strategy instruction" should be

made to support the information processing process. They also suggest that similar arrangements should be made for knowledge output.

Research emphasizes the dearth of information on the development of information processing processes in children with intellectual disabilities (Van Nieuwenhuijzen & Vriens, 2012; Vicari & Carlesimo, 2002). Indeed, a review of the literature reveals that studies on information processing processes based on children with intellectual disabilities (Jacobs & Nader-Grosbois, 2020; Van Nieuwenhuijzen & Vriens, 2012; Van Nieuwenhuijzen et al., 2011; Van Nieuwenhuijzen et al., 2007) mostly focus on social information processing. It should be noted that these studies specifically focus on the level of social information processing and problem behaviors of children with intellectual disabilities. In addition, while there are many studies on children with specific learning disabilities based on the information processing model, there appears to be a lack of research on information processing processes from the perspective of professionals working with children with intellectual disabilities (Hronis et al., 2017; Jacobs et al., 2020; Njelesani et al., 2022; Schuengel et al., 2019). Research emphasizes the significance of teachers in supporting information processing in children with intellectual disabilities. However, this requires teachers to be trained to overcome their lack of knowledge on the topic (Jacobs & Nader-Grosbois, 2020). The objective of this study was to investigate the implementation experiences of special education and classroom teachers working students with intellectual disability regarding their information processing processes. Additionally, this study aimed to identify the adaptations and regulations made to support such processes. To achieve these objectives, the following questions were explored:

RQ 1) What are the teachers' perceptions regarding the learning outcomes of students with intellectual disabilities?

RQ 2) How do teacher information processing practices differ?

RQ 3) How do teachers conceptualize information processing processes in children with intellectual disabilities?

RQ 4) In what ways do teachers perceive students with intellectual disabilities to demonstrate strengths and challenges in information processing?

2. Method

2.1. Research Design

The study was designed as qualitative research. According to Patton (2014), qualitative research provides detailed and deep information about the subjects to be researched. Researchers interact with the people they want to research and try to understand their interpretations through qualitative research (Glesne, 2013). There are many qualitative research methods used by researchers. This study was designed using a generic qualitative research design, one of the qualitative research methods. Generic qualitative research design is to gain insight into how individuals perceive and make sense of a given phenomenon or process (Merriam, 2009; Yin, 1984). In this study, the classroom practices of elementary school teachers and special education teachers with students with intellectual disabilities were examined according to of the "Information Processing Model". This subject has never been studied or addressed in the literature before. This study was conducted with teachers with students diagnosed with intellectual disability between the ages of 5 and 11, who work in segregated education environments, elementary schools, and special rehabilitation centers where students with intellectual disability attend.

2.2. Participants

In this study, the criterion sampling method, a type of purposive sampling, is used to determine the participants. In the criterion sampling method, the sample is determined within the framework of criteria such as important events, objects, or dates related to the research problem. Thus, it aims to include only people related to the research problem to reduce unnecessary time and cost (Patton, 2014). In this study, (a) working in segregated and inclusive educational settings, (b)

having students with intellectual disabilities in the classroom, (c) being an elementary school or special education teacher, and (d) having at least two years of teaching experience were used as the inclusion criteria. In qualitative research, sampling continues until there is no new information about the research problem. In other words, data collection continues until data saturation is reached. When the researchers no longer receive new information about the research problem from the sample, they terminate the data collection process (Merriam, 2009). For this study, the data collection process continued until data saturation was achieved. In total, data were collected from 61 teachers who met the predetermined criteria for the sample. Table 1 provides information on the demographic characteristics of the teachers.

Table 1

Demographic characteristics of the participants (n=61)

<i>Variable</i>	<i>f</i>	<i>%</i>
Gender		
Male	20	33
Female	41	67
Subject		
Elementary education (ED)	29	48
Special education (SE)	32	52
Seniority		
0-5	15	25
6-10	38	62
11+	8	13
Level of Intellectual Disability		
Mild	13	21
Moderate	32	52
Severe	16	26

As shown in Table 1, twenty of the participants were male and forty-one were female. Regarding their teaching field, thirty-two were special education teachers and twenty-nine were elementary school teachers. Fifteen participants had five years of professional experience, thirty-eight had between six and ten years, and eight had eleven years or more of professional seniority. It was also determined that among the students taught by these participants, thirteen had mild, thirty-two had moderate, and sixteen had severe intellectual disabilities.

2.3. Data Collection Tools

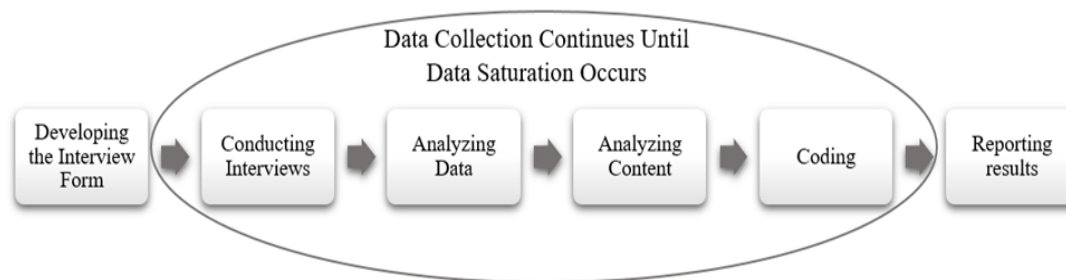
This study employed semi-structured interview forms as a primary data collection tool. There are two parts to the form. The first part consists of questions about the demographic information of the participants. In the second part, semi-structured questions are used, consisting of open-ended questions appropriate to the research problem. In the semi-structured interview technique, the researcher asks the participants questions that have been prepared in advance, and the order is entirely up to the researcher. The semi-structured interview form allows the researcher to be flexible and obtain in-depth information (Seidman, 2006).

In the preparation phase of the questions used in the research, (i) the research on the topic was reviewed, (ii) questions appropriate to the problem of the research were developed, (iii) an evaluation panel was held to obtain expert opinion, and the questions were finalized. Academics (10 academics from 5 different universities) were asked to evaluate the questions according to 5 different criteria. The experts considered the following criteria when evaluating the interview questions: (i) ease of understanding of the questions; (ii) focused questions; (iii) avoidance of prompting; (iv) absence of multidimensional questions; (v) appropriateness of probes. The Content Validity Ratio [CVR] was calculated to determine the consistency of the questions approved by the experts in terms of their ratings (Ayre & Scally, 2014). In this context, the CVR of the study was

calculated according to the formula: = number of experts indicating that the item is important (Ne)/total number of experts (N). Lawshe (1975) suggested that the ratio calculated by CVR should be at least 0.49 and above. This ratio was calculated for all questions in the interview form developed in this study, and it was found that the CVR ratio of each question wording varied between 0.80 and 0.96. This also ensured the validity of the statements used in the interview form. The questions agreed upon by the experts were included in the interview form, and the final version of the form was submitted. After the final version, we created structured interview forms as tools for collecting data. Next, we contacted the educational institutions where we had obtained research permission in advance and informed the teachers working in those settings about the study purpose and scope. Finally, the teachers who participated in the preliminary interviews were given the Informed Consent Form. The researchers arranged the place, date, and time of the interviews with the participants who consented by signing the Informed Consent Form. The interviews were conducted as planned, and the data obtained was later transcribed and computerized. The process continued until the data had reached saturation while considering its sensitivity towards the research problems. Following the described procedure, two separate coders encoded the computerized data. The data collection method utilized in this investigation is illustrated in Figure 2.

Figure 2

Research process



2.4. Data Analysis

Researchers recommend three methods for qualitative data analysis. The first method is to stick to the original responses and use them in the research report if necessary. Another method is to analyze the data using a descriptive method and create codes first. Then, categories can be formed from the codes, and themes can be formed based on the categories, and relationships between the themes can be established. The third method is analyzing the data by combining thematic and descriptive analysis with one's own interpretations (Guba & Lincoln, 1994; Maxwell, 2008; Pope et al., 2000). In this study, all three methods were used together and content analysis was conducted on the participants' responses. Content analysis was performed using the NVivo program. The codes and themes generated from the content analysis findings were modeled. Descriptive statistics for percentages and frequencies were also calculated. Cohen's kappa coefficient of agreement was calculated to determine the consistency between coders.

Content analysis involves four stages: (a) coding the data, (b) discovering codes, categories, and themes, (c) organizing codes, categories, and themes, and (d) interpreting the findings (Eysenbach & Köhler, 2022).

2.4.1. Coding the data

In qualitative data analysis, the coding unit must first be defined in order to create meaningful categories based on participants' responses. In qualitative research, the coding unit can sometimes be a word, a sentence, a paragraph, or even a meaning (Miles & Huberman, 1994). In this study, "meaning" was used as the coding unit. Based on the meaning underlying the participants' answers, their responses to the questions are analyzed within the framework of the research problem. This process continues throughout the data collection until data saturation occurs.

(Silverman, 2016). Two independent data coders took part in the coding process. The coders were given a preliminary sample of coding and preliminary information about how to code the subject.

2.5.2. *Creating codes, categories and themes:*

In this process, categories are created according to common responses or information based on the coding and themes are created that can underscore these categories (Strauss & Corbin, 1990). The coding process continued until the end of the research and was terminated when no new information emerged from the participant responses.

At the end of the coding process, Cohen's Kappa coefficient of agreement was calculated, and the consistency of both coders was examined. The Kappa coefficient of agreement was found to be 0.88. A Kappa coefficient of 0.80 and above indicates very good agreement between the coders (Rubinstein & Brown, 1984). Therefore, the inter-coder consistency is quite high.

To obtain common themes from the codes, grouped codes and themes that could represent these codes were created. In order to determine whether these themes represent the codes, expert opinion was consulted. The Kappa coefficient of agreement was calculated for the consistency between expert opinions. The coefficient of agreement obtained was found to be 0.96, which is sufficient for agreement. Thus, the themes created based on the coding were finalized.

2.5.3. *Organizing codes, categories and themes*

In this process, a systematic structure is created that can organize the data collected by the researcher in a meaningful way. At this stage, the researcher must organize and explain the information obtained in a way that readers can understand (Miles & Huberman, 1994). The categories and themes obtained in this research were treated within the framework of the theoretical infrastructure (information processing theory) and reorganized and restructured in a way that the reader can understand.

2.5.4. *Interpreting the results*

At this stage, the researcher establishes a causal connection between the data collected and the research problem, including their own interpretation (Marshall & Rossman, 2014). This study presents results in a cause-and-effect relationship, providing an explanation of their connection to the research problem.

3. Results

At this stage, the sub-themes identified in relation to the main themes and the modeling of the codes associated with these sub-themes are shown in tables. Codes and sub-themes were supported by direct quotes from participants.

3.1. Teachers' Views on Students' Learning Outcomes

Table 2 presents the themes, sub-themes, and codes reflecting special education teachers' perceptions of students' learning outcomes across cognitive, socio-emotional, and motor domains. The findings indicate that teachers view learning as a multidimensional process involving not only academic skills such as reading, writing, and mathematics, but also social communication and physical coordination. Overall, the table highlights that special education teachers assess learning outcomes holistically—considering students' cognitive development, ability to follow instructions and communicate, and fine motor skills. This comprehensive perspective demonstrates that teachers aim to support both academic progress and functional independence, recognizing the interconnected nature of cognitive, emotional, and motor abilities in the learning process.

Table 2
Special Education Teachers' Perceptions of the Learning Outcomes

<i>Themes and sub-themes</i>	<i>Codes</i>
Cognitive	
Reading	Reading comprehension, recognizing sounds, recognizing concepts
Writing	Basic writing skills
Mathematics	Four operations skills, addition without hands, counting simple numbers
Socio-Emotional	
Following the Given Instructions	Following steps, completing simple tasks
Low Level of Speaking	Limited vocabulary, short sentences, needs prompts
Poor Communication Skills	Difficulty starting conversation, poor understanding
Motor Skills	
Poor Fine Motor Skills	Weak grip, low precision
Establishing Hand-Eye Coordination	Matching by sight, coordination tasks
Draw Simple Lines	Line drawing practice

In the first main theme, "Cognitive," special education teachers focused on students' development of academic and intellectual skills, which were grouped under the sub-themes of "Mathematics," "Reading," and "Writing." These sub-themes represent the foundational areas through which teachers assess students' cognitive learning outcomes and academic progress. The findings revealed that students demonstrate varying levels of performance across these domains. In the reading sub-theme, teachers identified codes such as "Reading comprehension," "Recognizing sounds," and "Recognizing concepts." These indicate that reading instruction in special education focuses not only on decoding but also on understanding and associating sounds and meanings. As teacher SE1 explained: "The class is able to identify the second group of phonemes and perform addition without carrying." This suggests an integrated approach, where reading and mathematical skills are developed concurrently, reflecting the interconnectedness of literacy and numeracy in cognitive development. Within the writing sub-theme, the code "Being able to write" highlights the emphasis on fine motor and symbolic representation skills. Writing is perceived as both an academic and a functional skill, contributing to students' independence and self-expression. An overall perspective was provided by teacher SE5, who stated:

...Literacy and academic skills are present. They have independent living skills. One of the students is at the literacy level, two of the students are at the beginning concept level, two of the students are doing line work, and the others are working on muscle skills.

This comment emphasizes that students' cognitive achievements are highly individualized and interconnected with their functional and motor abilities. Similarly, in the mathematics sub-theme, the identified codes illustrate that teachers observe gradual progress in students' numerical comprehension and computational abilities. For example, the teacher coded SE9 described this development as follows: "They are at the level of literacy, reading comprehension, and simple math operations. They can express some faded letters. They can do addition without their hands." This statement reflects that students can perform basic mathematical operations independently, showing a transition from concrete to more abstract cognitive skills.

In the second main theme, "Socio-Emotional," special education teachers emphasized students' emotional regulation, communication abilities, and responsiveness to instructions—skills that are crucial for both academic learning and daily functioning. These codes reflect the social and emotional challenges frequently observed among students with moderate to severe intellectual disabilities, particularly in their ability to express themselves, comprehend spoken language, and maintain appropriate behavioral and emotional responses. Teacher SE3 described these difficulties vividly, explaining that:

...I work with students with moderate to severe intellectual disability. My students have difficulties with speech and language. Almost all of them have behavioral problems. When I work with them, their communication is inadequate. They do not understand the topics. In other words, they have poor communication skills.

This observation highlights that limited verbal expression and weak receptive language skills often lead to communication breakdowns, making it difficult for students to fully participate in learning activities or social interactions. Moreover, these limitations can contribute to behavioral challenges and hinder the development of peer relationships. Teachers also reported that many students require structured support and repeated guidance to follow verbal instructions and classroom routines. Therefore, socio-emotional learning in special education contexts extends beyond traditional academic goals, involving fostering communication, social interaction, and emotional self-regulation through consistent modeling, reinforcement, and individualized strategies.

In the third main theme, "Motor Skills," special education teachers focused on students' physical coordination, fine motor control, and ability to carry out basic tasks that require precision and sequencing. The sub-theme codes identified under this category highlight the essential role of motor development in supporting both academic and functional learning outcomes for students with intellectual disabilities. Teacher SE15 provided a positive example of progress in this area, explaining: "...They can do hand-eye coordination. They can follow the instructions according to the order. They can complete the given matching cards. They can perform personal hygiene skills". This statement illustrates that as students develop hand-eye coordination and fine motor control, they also improve in following instructions, sequencing tasks, and carrying out daily routines independently. The ability to manipulate objects, match cards, or perform hygiene skills reflects not only physical coordination but also cognitive organization and attention to order, showing the interconnected nature of motor and cognitive domains.

Overall, the findings indicate that while students with intellectual disabilities often display limited cognitive, socio-emotional, and motor abilities, targeted instruction and consistent practice can lead to measurable improvements. The teachers' observations suggest that developing fine motor and coordination skills contributes significantly to students' overall learning readiness, independence, and self-care capabilities.

Table 3 presents the themes and sub-themes that describe elementary education teachers' perceptions of students' learning outcomes, focusing on both academic and socio-emotional domains.

Table 3

Elementary Education Teachers' Perceptions of the Learning Outcomes

Themes	Subthemes
Cognitive	Reading
	Writing
	Mathematics
Socio-Emotional	Motivation to Carry Out Social Activities Alone
	Oral Response to Questions
	Poor Communication Skills

Table 3 shows that teachers evaluate learning outcomes primarily through cognitive skills—such as reading, writing, and mathematics—while also considering students' motivation, communication abilities, and social participation as indicators of broader educational progress.

In the first main theme, "Cognitive," elementary education teachers focused on students' basic academic competencies, particularly in reading, writing, and mathematics. These sub-themes represent the core areas through which teachers assess students' academic progress and readiness for further learning. The findings reveal that teachers generally emphasize literacy and numeracy skills as the primary indicators of cognitive development, often highlighting students' ability to

perform simple operations and comprehend written material. For instance, teacher ED1 described students' academic abilities as follows: "...They can read and write. They have four operations skills. They can do simple math operations. I can say that my students can read and write". Similarly, teacher ED30 shared a comparable perspective, stating: "They can read and write. They have grasped the four operations". These statements suggest that elementary education teachers perceive functional literacy and numeracy as key cognitive outcomes, reflecting a focus on concrete academic achievements rather than on the underlying cognitive or developmental processes. The emphasis on reading, writing, and arithmetic aligns with the foundational goals of elementary education, where mastery of basic academic skills forms the basis for more advanced learning. However, it is noteworthy that elementary school teachers did not mention motor skills in their evaluations of learning outcomes. This indicates a difference in perspective compared to special education teachers, who tend to adopt a more holistic approach that includes cognitive, socio-emotional, and motor development.

In the second main theme, "Socio-Emotional," elementary education teachers emphasized that students with intellectual disabilities exhibit limited social interaction, motivation, and communication skills. The sub-themes identified under this category reflect teachers' observations that students often struggle to engage meaningfully in social contexts, express themselves verbally, or sustain interpersonal interactions in the classroom. The findings indicate that elementary school teachers generally perceive the socio-emotional competencies of their students as underdeveloped compared to their cognitive skills. For example, teacher ED22 described students' restricted expressive abilities as follows: "...students respond to questions with a very limited range of words." This comment highlights that students often have difficulty forming complete verbal responses or maintaining conversations, which can hinder both learning and social participation. Similarly, teacher ED17 emphasized the challenge of sustaining interaction, stating: "...interaction with my students generally remains limited." These observations suggest that although students may acquire basic academic skills, their communication and emotional engagement remain constrained, limiting their ability to apply learning in social or collaborative situations. Teachers also noted that low motivation to initiate or participate in social activities contributes to this limitation.

3.2. Teachers' Views on the Information Processing

The opinions of the special education and elementary school teachers on information processing are shown in Table 4.

Table 4

Special Education Teachers' Perceptions of the Information Processing

<i>Themes and sub-themes</i>	<i>Codes</i>
Information Input	
Seeing	Interaction with materials, understanding colored words, seeing colors
Hearing	Verbal instructions
Information Output	
Seeing	Independent application of the outcomes, touching colors
Motor	Pointing at colors
Information Processing	
Seeing	Hand washing, time needed for color recognition, reinforcing
Touching	Physical clues
Motor skills	Time for showing colors
Feeling	Repetition of information

Table 4 reveals that teachers associate information processing with multiple sensory modalities—particularly seeing, hearing, touching, and motor activities—each contributing

differently to students' understanding and expression of information. The subthemes and codes for "information input" emphasize the significance of visual stimuli in facilitating the comprehension and retention of information among students with special needs. Teachers highlighted that color and visual interaction enhance attention, engagement, and memory during learning tasks. For instance, participant SE9 elaborated on how visual cues play a crucial role in assessing and improving students' comprehension levels:

...As an example of information input, I can give the example of determining students' level of understanding of words. In the process of information processing, I can give the example of processing information with colored words. As an example of knowledge output, I can show a lot of repetition. Immediate learning occurs with my students. This learning disappears after a while.

This statement indicates that students initially respond effectively to color-coded and visually supported materials, which facilitate immediate comprehension. However, SE9 also noted that without consistent reinforcement and repetition, the acquired knowledge tends to fade over time.

In the second main theme, "Information Output," teachers' views focused on how students express or demonstrate the knowledge they have gained through learning activities. The related codes emphasize that students' ability to show what they have learned often depends on both visual recognition and motor coordination. Teachers highlighted that in special education settings, promoting independent performance is a crucial indicator of successful learning outcomes. The opinion of a special education teacher, SE26, regarding the output of information among students with intellectual disabilities, illustrates this perspective:

...I support the input of information with materials in the classroom environment. I try to process the information by repeating the necessary reinforcements abundantly. In the information output, I try to ensure that the students realize the acquisition independently.

This explanation underscores the importance of creating a supportive learning environment where visual and tactile materials facilitate understanding, and continuous reinforcement helps solidify learning. Ultimately, the goal of the information output process is to guide students toward independent application, allowing them to demonstrate learned skills without constant teacher assistance. This independence reflects both cognitive understanding and the development of motor coordination, which together signify meaningful and lasting learning achievements in students with intellectual disabilities.

In the third main theme, "Information Processing," teachers discussed how students transform, internalize, and retain the information presented to them through various sensory and experiential methods. The related codes reveal that the process of information handling involves sustained engagement, repetition, and the integration of sensory and motor activities. Teachers emphasized that information processing is not an immediate or linear act but rather a gradual progression supported by continuous reinforcement and practical application. Among the views that emerged regarding this theme, the insights of teacher SE18 are particularly noteworthy:

...New information is presented to the student by me and the information is repeated for at least five sessions. As a result of the student's realization of the skill, support is given to the formation of teaching by going to the evaluation stage and checking how much he/she has learned the information.

This explanation highlights that systematic repetition and ongoing assessment are central to effective information processing in students with special needs. The teacher's structured approach—introducing new knowledge, reinforcing it through multiple sessions, and evaluating mastery—reflects a cyclical learning model where processing, practice, and assessment are intertwined. Such a process ensures that students not only acquire knowledge but also internalize and apply it meaningfully, bridging the gap between short-term comprehension and long-term learning retention.

Table 5
Elementary Education Teachers' Perceptions of the Information Processing

Themes and sub-themes	Codes
Information Input	
Feeling	Applying age-appropriate methods, peer support, progressing from concrete to abstract in teaching subjects
Seeing	Hand-washing style
Information Output	
Seeing	Independent hand-washing
Hearing	Assessment of the level, understanding information, applying the outcomes, using verbal and written instructions, receiving feedback late
Information Processing	
Seeing	Repeating hand quashing skills
Hearing	Repetition of information, keeping the time long

The findings indicate that teachers perceive information processing as a dynamic and cyclical process that involves seeing, hearing, and feeling as key sensory dimensions. In the first main theme, "Information Processing," elementary education teachers emphasized the significance of sensory engagement—particularly through seeing and hearing—in helping students internalize and retain information. The codes under this theme reflect that teachers frequently rely on repetitive practices and extended exposure to reinforce learning. However, despite their familiarity with classroom practices that involve repetition and observation, it is also evident that elementary education teachers possess less specialized knowledge about the cognitive mechanisms of information processing compared to special education teachers. Their views suggest that while they apply certain instructional strategies effectively, they often do so without a deep theoretical understanding of how information is encoded, processed, and retrieved by students. For instance, the teacher coded ED19 acknowledged limited experience in this area: "...I cannot say anything about knowledge input and knowledge processing processes, but in the process of knowledge evaluation I try to evaluate with different verbal and written instructions".

This statement indicates that some elementary teachers primarily focus on the evaluation phase rather than the detailed cognitive stages of input and processing. Therefore, while they employ repetition and sensory engagement as practical methods, their perceptions reflect a more procedural rather than conceptual understanding of information processing.

In the second main theme, "Information Output," elementary education teachers focused on how students demonstrate, apply, and express the knowledge they have gained throughout the learning process. The subthemes show that teachers perceive the output phase as the point where students' comprehension becomes observable through performance, behavior, and communication. The teacher coded as ED4 shared insights that exemplify how the process of information output is connected to earlier stages of learning:

...In the beginning, I try to use methods that are appropriate for their level to input information. Afterwards, I try to make sure that they learn by keeping the time long. I do this while processing the information. Finally, I evaluate their level to see if the gains have been realized. I do this during the output of the information.

This statement reflects an understanding of learning as a progressive cycle—beginning with input, reinforced through processing, and culminating in output. ED4's approach emphasizes both time management and evaluation, indicating that sustained engagement and systematic assessment are crucial for verifying whether learning objectives have been achieved. Additionally, the use of both verbal and written instructions during the output stage demonstrates an effort to address diverse learning needs and communication styles.

In the third main theme, “Information Input,” elementary education teachers emphasized the initial stage of learning, where knowledge is introduced and made accessible to students through sensory and social experiences. These subthemes suggest that teachers view the input phase as the foundation for effective learning, where the way information is presented determines how well students can process and later apply it. Unlike special education teachers, elementary teachers displayed subtle differences in their understanding and approach to information input. Their focus was more on developmentally appropriate teaching strategies and social learning elements, rather than on sensory adaptation or individualized reinforcement. The teacher coded as ED29 illustrated this perspective: “...In order to provide my students with knowledge input, I teach the topics from concrete to abstract. I also think that peer support is important in this context.”

3.3. Teachers’ Views on the Information Processing Activities

Table 6 presents the themes and sub-themes related to special education teachers’ perceptions of information processing activities.

Table 6

Special Education Teachers’ Perceptions of Information Processing Activities

Themes	Sub-themes
Outputs	Measuring retention Introducing a new skill Receiving Feedback Informing the parents Measuring the level of achievement Concrete data Understanding Ensuring pre-learning Measuring generalization Obtaining information Tracking student progress Planning curriculum
Inputs	Determining the level of learning Determining specific teaching objectives Evaluating at regular intervals

The data reveal that teachers perceive these processes as interconnected and cyclical—where inputs establish the foundation for instruction and outputs reflect the observable outcomes of learning. However, it is noteworthy that they did not mention the processing element, which is another important element of information processing. In the first main theme, “Outputs,” special education teachers emphasized the processes that occur after instruction—specifically how students demonstrate learning, retain information, and transition to new skills. These subthemes collectively illustrate that teachers view the output stage not merely as the end of a learning process, but as an evaluation and transition phase that informs subsequent teaching steps. The teacher coded SE7 clearly expressed this cyclical and reflective understanding of learning outcomes:

...In order to teach a new skill, the previous learning is evaluated by generalizing. When the student receives the information, we move on to the new information. So, depending on the results of the classwork, I follow such a way because I plan to measure the student's level of success and move on to the next stage.

This statement highlights that output activities serve as both an assessment and a bridge to further learning. SE7’s approach demonstrates that before introducing new content, teachers in special education assess students’ prior understanding and ability to generalize knowledge—a crucial aspect for learners who may struggle with transferring skills across contexts. By

continuously measuring achievement and monitoring progress, teachers ensure that each instructional step builds upon a solid foundation of prior learning.

In the second main theme, “Inputs,” special education teachers emphasized the preparatory and evaluative stages of the learning process, focusing on how information processing activities are designed, monitored, and adjusted to meet students’ individual needs. These sub-themes indicate that teachers consider information input not only as the presentation of content but also as a systematic and data-driven process of identifying students’ current performance levels, setting measurable goals, and revisiting these goals through continuous assessment. The teacher coded SE32 described this structured and reflective approach as follows:

...I organize information processing activities in order to monitor the development of my student, to prepare reports about my student for the evaluation of the Guidance and Research Center and to inform my parents. Thus, I evaluate the curriculum at regular intervals in order to achieve the planned progress.

This statement highlights the comprehensive role of input activities in special education – encompassing not only classroom instruction but also diagnostic evaluation, progress tracking, and communication with external stakeholders such as parents and guidance centers. SE32’s approach demonstrates that input-related processes are essential for individualized curriculum planning and ensuring that each student’s developmental trajectory is accurately monitored and documented.

Table 7 presents the themes and sub-themes reflecting elementary school teachers’ perceptions of information processing activities.

Table 7

Elementary Education Teachers’ Perceptions of Information Processing Activities

<i>Themes</i>	<i>Sub-themes</i>
Information Input	Simple activities appropriate
Information Process	Remedial education
	Determining the level of understanding subjects
	Repeating subjects
	Moving on to the next skill
Information output	Moving on to the next skill
	Determining the level of understanding subjects
	Feedback
	Developing new method
	Determining the level of curriculum practice
	Evaluating outcomes
	Evaluating progress

The data illustrate how teachers conceptualize the stages of information input, processing, and output within their instructional practices. Elementary school teachers generally perceive information processing as a sequential and practical process, beginning with the use of simple and level-appropriate activities (information input), followed by remedial instruction, repetition, and gradual progression toward new skills (information processing) and output.

In the first main theme, “Information Input,” elementary school teachers focused on the initial stages of the learning process, where instructional activities are designed to introduce and prepare students for new knowledge and skills. The sub-theme indicates that teachers prioritize accessibility and clarity, ensuring that the materials and methods used align with students’ developmental levels. This approach reflects an emphasis on readiness and suitability, helping students engage effectively with new content and laying a foundation for further learning. The teacher coded ED11 provided an insightful perspective that extends the understanding of information input beyond mere content delivery:

...I evaluate the information processing processes to understand to what extent the planned program is being implemented and what level of behavior the student has attained. Did the planned program achieve its goal? I evaluate these processes to see if the program was useful.

This statement highlights that, for some elementary teachers, the input phase also involves evaluating the effectiveness and relevance of the instructional plan itself. ED11's comment suggests that teachers not only focus on presenting information but also assess whether the chosen activities and strategies truly facilitate learning and behavioral development.

In the second main theme, "Information Processing," elementary school teachers described how they structure and adapt the teaching process to help students internalize and strengthen their understanding of subjects. The sub-themes reflect a systematic and progressive approach, where instruction is continuously adjusted according to students' needs and responses. Teachers emphasized that repetition, questioning, and gradual advancement are essential strategies for ensuring that learning becomes both meaningful and lasting. The teacher coded ED16 illustrated this approach through a practical and student-centered example:

...I begin the lesson with simple activities appropriate to the child's level. I move on to the next skill with additional instructions appropriate to the child's level. I include five minutes of question and answer time in each lesson. I also enrich the activities by organizing additional photocopies for the class.

This statement highlights a deliberate focus on differentiation and reinforcement within the learning process. ED16's strategy of beginning with level-appropriate tasks, supplementing them with extra materials, and incorporating question-and-answer sessions demonstrates an effort to maintain engagement and provide continuous feedback. Such practices embody the essence of information processing — transforming input into understanding through active participation, repetition, and varied instructional methods.

In the third main theme, "Information Output," elementary school teachers focused on how they assess, reinforce, and evaluate students' learning outcomes after instruction. These sub-themes collectively emphasize that teachers view information output as a reflection and evaluation stage, where the effectiveness of both teaching and learning is systematically monitored. The teacher coded ED22 explained this perspective by describing a practical assessment approach:

...I do book exercises to understand if they have grasped the subject at the moment. The reason for this is that I want to evaluate at regular intervals. I give support training to repeat the subject. In this way, I want to determine the level of implementation of the program.

This statement highlights that elementary teachers not only focus on assessing student performance but also use these evaluations to inform their instructional decisions and ensure that curriculum goals are being met. The integration of book exercises and regular assessments indicates an ongoing process of feedback, reinforcement, and program evaluation, rather than a one-time measurement of success.

3.4. Teachers' Views on Supporting the Information Processing

Table 8 presents the themes and sub-themes related to how special education teachers support information processing through various instructional, environmental, and evaluative strategies. The findings reveal that teachers employ a wide range of practices—spanning from classroom preparation and input methods to processing and output activities—to ensure effective learning for students with diverse needs. Overall, the table highlights that support for information processing in special education involves a holistic approach, combining pedagogical adaptation, environmental arrangement, and continuous assessment to foster students' engagement, comprehension, and performance.

In the first main theme, "Information Output," special education teachers focused on how they evaluate and measure students' learning outcomes using varied and individualized methods. The sub-themes indicate that teachers employ multiple strategies to capture students' achievements

Table 8

Special Education Teachers' Perceptions of Supporting the Information Processing

<i>Themes</i>	<i>Sub-themes</i>
Information Output	Measuring activities with different assessment tools Assessing by skill type Administering a general assessment exam Execute instructions completely
Preparation process	Light distribution in the classroom Counseling support Classroom temperature Supporting with video and games Seating arrangement Parent meeting Isolating hazardous tools and equipment
Information Input	Using a smart board Supporting with materials Eliminating distractions
Information Process	Creating and experiential learning environment Repletion Implementing level appropriate activities Applying different teaching methods Selecting appropriate materials Motivating Applying the drama method Eliminating distractions

according to their abilities and learning styles. It was observed that while some teachers conducted general assessment exams, others preferred more flexible and student-centered approaches. Specifically, two teachers used different assessment tools, two carried out skill-based evaluations, and two administered general exams. However, some teachers were noted to have applied the given instructions incompletely, reflecting variability in assessment practices across classrooms. An illustrative example comes from the teacher coded SE14, who emphasized the importance of alternative assessment methods: "...Since many of my students struggle to express knowledge in writing, I use alternative assessment methods such as oral presentations and visual projects to evaluate their knowledge output." This statement underscores a key principle in special education – that assessment should be adaptive and inclusive, providing multiple avenues for students to demonstrate what they have learned. By using oral and visual formats, SE14 ensures that students who face challenges with written expression can still participate meaningfully in evaluation processes.

In the second main theme, "Preparation Process," special education teachers described the environmental and organizational arrangements they make to create an optimal learning atmosphere that supports students' information processing. These practices demonstrate that teachers view preparation not merely as a logistical step, but as a foundational phase that directly influences students' attention, comfort, and engagement in the learning process. When the data were examined, it was found that two teachers reported using videos and games to enrich the preparation process, while others emphasized physical and environmental factors such as seating arrangements, classroom lighting, and temperature. Additionally, teachers mentioned ensuring safety by isolating hazardous tools and maintaining communication through parent-teacher meetings and guidance support. An example of this perspective was provided by teacher SE1, who described their approach as follows: "...I start by organizing the seating arrangement, classroom temperature and light". This statement illustrates a deliberate effort to create a supportive and distraction-free environment before the learning process begins. SE1's focus on environmental

regulation underscores the belief that a well-prepared classroom enhances students' readiness to learn and minimizes sensory overload, which is particularly important for students with special needs.

In the third main theme, "Information Input," special education teachers emphasized how they prepare and present learning content in ways that accommodate students' individual needs and minimize barriers to engagement. The sub-themes show that teachers adopt both technological and environmental strategies to facilitate effective information reception. According to the findings, five teachers reported supporting the input process with various instructional materials, such as tactile objects, visual aids, or manipulatives, to make learning more concrete and accessible. Four teachers emphasized eliminating distractions, recognizing that managing attention is critical for students with special needs. Additionally, one teacher noted the use of a smart board to make lessons more interactive and visually engaging. A clear example of differentiated instruction was provided by teacher SE29, who described how she adapts her classroom setup to meet diverse learning needs:

...I take the student who puts everything in his/her mouth to a separate table and make a lesson suitable for his/her level. While we are working on reading and writing with other students, we are doing plug-and-subtract work with another student.

This statement reflects a highly individualized and adaptive teaching approach, where instruction is tailored to students' sensory, cognitive, and behavioral characteristics. SE29's practice demonstrates both instructional flexibility and awareness of students' developmental differences, ensuring that each learner receives input at an appropriate level and in a suitable environment.

In the fourth main theme, "Information Process," special education teachers focused on the strategies they use to help students actively engage with and internalize information. These sub-themes reflect a rich variety of practices aimed at sustaining attention, reinforcing learning, and promoting meaningful understanding. The findings revealed that three teachers focused on eliminating distractions during the learning process, while another three teachers emphasized selecting appropriate materials suited to students' levels and needs. Additionally, some teachers incorporated motivational strategies, repetition, and experiential learning to make instruction more dynamic. Notably, one teacher applied the drama method, using movement and role-playing to help students grasp abstract concepts through active participation. Teacher SE11 illustrated this approach effectively, stating: "...Using drama activities allows my students to experience concepts through movement and role-playing contributing to more effective learning." This comment underscores the importance of experiential and embodied learning in special education. By allowing students to act out concepts, teachers make abstract ideas more tangible and relatable, enhancing both comprehension and memory.

Table 9 presents the themes and sub-themes related to elementary school teachers' practices for supporting information processing during teaching and learning activities. The findings indicate that teachers employ a range of input, process, output, and preparation strategies to facilitate students' comprehension, engagement, and skill development.

In the first main theme, "Output," elementary school teachers focused on how they evaluate and interpret students' learning performance after instructional activities. These findings indicate that teachers emphasize the importance of continuous and multifaceted evaluation, using various forms of feedback and observation to understand how effectively students have internalized and applied what they learned. In this context, two teachers reported that they assessed students' behaviors as indicators of learning progress, while others mentioned using activity-based feedback, cross-sectional evaluations, and outcome assessments to gain a comprehensive view of student performance. Such practices show that teachers consider not only academic outcomes but also behavioral responses and engagement levels as valuable components of the output process. A practical example of this approach was provided by teacher ED3, who highlighted the need for

Table 9

Elementary Education Teachers' Perceptions of Supporting the Information Processing

<i>Themes</i>	<i>Sub-themes</i>
Output	Receiving feedback from activities Assessing behaviors Making cross-sectional assessment Assessing learning outcomes
Input	Audio-visual application Applying teaching techniques Supporting play with press Supporting with materials Performing hands-on activities Drawing attention
Process	Repetition Various activities Experience based activities Discussions Giving examples Memory games Applying different teaching methods
Preparation process	Teaching extra lessons Implementing individualized education program Having level-appropriate activities Reading level-appropriate test

adapting feedback methods to students' individual learning profiles: "...Some of my students need feedback in visual or simplified formats because verbal explanations alone are not sufficient for them to understand their performance." This statement underscores the significance of differentiated feedback in the output stage. ED3's emphasis on visual and simplified formats reflects an understanding that effective evaluation requires clear, accessible, and personalized communication of results, especially for students who may struggle with verbal comprehension.

In the second main theme, "Information Input," elementary school teachers emphasized the methods and strategies they use to capture students' attention and introduce new learning content effectively. The sub-themes reveal that teachers focus on engagement, interaction, and sensory stimulation during the initial phase of learning. The analysis showed that three teachers prioritized drawing students' attention as a critical first step in the learning process, recognizing that attention regulation is essential for effective information intake. Additionally, several teachers incorporated materials, hands-on activities, games, and audio-visual tools to make learning more concrete and enjoyable. These practices suggest that teachers value multisensory and participatory approaches, which help bridge the gap between students' experiences and abstract concepts. An illustrative example was provided by teacher ED26, who described a structured and individualized instructional approach:

...I teach through error-free teaching models, direct instruction. I include repetition with structured environment organization. I ensure reinforcement through activities. I make continuity and generalization planning by evaluating the student's intellectual disability through deferred assessments.

This reflection highlights a comprehensive understanding of the input process—where structured, consistent, and reinforced instruction is used to ensure comprehension and retention. ED26's emphasis on direct instruction and reinforcement indicates a clear alignment with evidence-based teaching practices, particularly for students with diverse learning needs.

In the third main theme, "Information Process," elementary school teachers focused on how they help students actively engage with and internalize information after it has been introduced.

Together, these sub-themes highlight that teachers use a wide range of strategies designed to make learning interactive, experiential, and personally meaningful for students. According to the findings, two teachers reported using varied activities to sustain students' interest and attention, while another two teachers emphasized applying different teaching methods to accommodate diverse learning styles. Other teachers mentioned using memory games, reciprocal conversations, examples, and experiential activities, all of which reflect an emphasis on active participation and real-life connections in the learning process. A particularly illustrative example was provided by teacher ED8, who highlighted the importance of experiential learning: "...My students learn more effectively through hands-on activities, which help them relate abstract concepts to real-life situations, even if only to a limited extent." This statement underscores that learning by doing plays a crucial role in helping students, especially those with varying cognitive abilities, to bridge the gap between abstract ideas and tangible understanding. ED8's use of hands-on activities reflects a student-centered approach that values concrete experiences, repetition, and contextualization as key components of meaningful learning.

In the fourth main theme, "Preparation Process," elementary school teachers focused on how they organize and plan instructional activities before the actual teaching begins. This stage represents the foundation of effective learning, as it involves aligning content, methods, and materials with students' individual abilities and needs. The sub-themes highlight teachers' efforts to ensure that lessons are both accessible and tailored to diverse learners. The findings revealed that five teachers completed the preparation process through individualized education programs, ensuring that instruction was specifically designed to address each student's strengths, weaknesses, and learning goals. Additionally, some teachers supplemented this with extra lessons, level-appropriate activities, or texts suited to students' reading abilities, showing a strong commitment to differentiated instruction. A clear example of this personalized approach was provided by teacher ED17, who explained: "I read texts appropriate to the level of the student. I try to determine the level accordingly." This statement demonstrates how teachers use diagnostic and preparatory activities to identify students' readiness levels and adapt content accordingly. ED17's approach reflects a thoughtful process of ensuring that materials match students' comprehension and performance levels, which helps establish a supportive learning environment from the very beginning.

4. Discussion

The impact of cognitive impairment on learning is an important deficiency and limitation for children with intellectual disabilities in acquiring academic and social skills and using them in context. For this reason, teachers need to make some arrangements such as pedagogical, physical and equipment to support the learning processes of children with intellectual disabilities. These accommodations should undoubtedly target the information processing processes of children with intellectual disabilities. In general, the results of the study show that both special education teachers working in segregated educational settings and elementary school teachers working in inclusive educational settings have inadequate knowledge of information processing processes. Moreover, it shows that teachers in neither group decide for information processing processes, which are extremely important for children with intellectual disabilities, and do not take this important structure of the learning process into account when planning instructional processes.

The results of the study show that the learning outcomes of students with intellectual disabilities attending segregated educational settings is clustered under three themes: cognitive (reading, writing, and arithmetic), social-emotional (communication), and psychomotor (drawing simple lines, weakness in fine motor skills, and weakness in hand-eye coordination). Several studies have highlighted the difficulties students with intellectual and learning disabilities face, particularly in mathematics, reading, and writing (Yılmaz & Yılmaz, 2024). For example, many studies have shown that segregated learning environments limit the ability of students with intellectual disabilities to develop real-life skills and behaviors (Abu-Alghayth, 2022). However,

several studies have demonstrated that students with disabilities are also capable of learning effectively within general education settings (Schnepel et al., 2020). The structure of the general education curriculum has been identified as a barrier to academic progress for students with intellectual disabilities (Gunderson, 2017). In some cases, students with intellectual disabilities can overcome communication and social skills challenges by learning alongside typically developing classmates (Kuntz & Carter, 2019). Additionally, there is a growing body of evidence that students with the most severe cognitive disabilities are able to learn in general education settings with the support and mediation of typically developing peers (Cole et al., 2004; Kleinert, 2015). The related research literature has confirmed that students with intellectual disabilities face significant difficulties in academic achievement, particularly in mathematics, reading, and writing (Kiani & Miller, 2010; Nilsson et al., 2021). The learning outcomes of students with intellectual disabilities attending inclusive educational settings is clustered under two themes: cognitive (reading, writing, and mathematics) and social-emotional. Information processing in students with intellectual disabilities is a critical issue that significantly affects their learning and cognitive abilities. Studies in the literature shed light on the difficulties that children with intellectual disabilities face in processing information, especially through visual and auditory skills (Blasi, et al., 2007). Blasi et al. (2007) assert that individuals with intellectual disabilities have difficulty evaluating and processing information, suggesting potential difficulties with information input. In addition, Sterkenburg et al. (2022) emphasize that people with intellectual disabilities can benefit from information materials designed specifically for them to improve their decision-making processes in a healthy way, highlighting the importance of considering their specific sensory needs when processing information. Furthermore, Kiani and Miller (2010) emphasize that sensory impairments, including visual and hearing impairments, have a significant negative impact on the socio-cognitive and language development of individuals with intellectual disabilities, further highlighting the importance of understanding sensory processing in this context. Understanding the specific sensory and cognitive needs of people with intellectual disabilities is critical to developing effective interventions, support strategies to enhance their information processing, and overall learning experiences.

The results show that students with intellectual disabilities in both segregated and inclusive educational settings have similar academic performance. Considering that students attending inclusive educational settings are affected by mild intellectual disabilities, the learning outcomes of students with intellectual disabilities in both educational settings is expected to be in favor of students attending inclusive educational settings (Dessemontet et al., 2012; Forlin & Chambers, 2011). According to the results of the meta-analysis study conducted by Forlin and Chambers (2011), students with intellectual disabilities show that their academic performance changes positively when they receive inclusive education. In addition, the results of the study emphasize the critical role of social interaction in supporting the academic development of students with intellectual disabilities in inclusive classrooms. The socialization opportunities created by inclusive settings contribute to a supportive and collaborative learning environment in which typically developing peers serve as positive role models (Mihajlovic, 2020). This social integration not only enhances the socio-affective development of students with intellectual disabilities, but also has a positive impact on their cognitive and academic development. Similarly, Avramidis and Norwich (2002), in their research examining the impact of inclusive education on educator expectations and attitudes, concluded that there is a positive correlation between the inclusive education model and high academic expectations. In addition, Kluth and Straut (2003) draw attention to the long-term benefits of inclusive education for students with intellectual disabilities, who found that students who experience inclusive education show more academic development than their peers educated in segregated settings (Kluth & Straut (2003). In conclusion, the research provides solid evidence of the academic benefits associated with inclusive education for students with intellectual disabilities.

Although studies in the literature show results in favor of students with intellectual disabilities attending general education settings in terms of academic achievement (Baker & Zigmond, 2009;

Johnson & Brown, 2007), the results of the current study show that the academic achievement of both groups is similar. This suggests that the teachers working in both educational settings (special education and elementary school teachers) did not make the necessary arrangements for these children, and moreover, the teaching provided was not in a way to improve their academic performance. Gheysens et al. (2023) emphasized the importance of differentiated instruction in inclusive settings. Researchers argue that inclusive education aims to meet diverse learning needs, but teachers often struggle to implement differentiated instructional strategies effectively. When differentiated instructional strategies are not adequately implemented, students with intellectual disabilities may not receive the specialized support necessary for satisfactory academic development. Furthermore, Baker and Zigmond (2009) examined teacher expectations in shaping the academic skills of students with intellectual disabilities in mainstream classrooms. They concluded that when teachers unintentionally or otherwise have lower expectations for these students, the quality of instruction provided by the teacher is negatively affected and students struggle to reach their full academic potential. Johnson and Brown (2007) emphasize that the professional inadequacies of teachers working in inclusive education settings are one of the biggest obstacles to supporting the academic and emotional development of students with intellectual disabilities. Similarly, Lindner and Schwap (2020) elucidate the inherent challenges of implementing differentiated instruction within inclusive educational environments, noting that educators frequently experience difficulties in translating these pedagogical principles into effective classroom practice. The results of the current study show that errors in teacher practices due to lack of knowledge about special education can negatively affect the implementation of effective teaching strategies. Moreover, the findings suggest that errors in teacher practice may have a positive or negative impact on the similarities in academic performance observed between students with intellectual disabilities and their typically developing peers.

In addition, while teachers talk about the academic performance of children with intellectual disabilities, they also evaluate social-emotional and psychomotor skills in this category, which shows that they are weak in terms of domain competencies. The academic performance of children with intellectual disabilities is a complex issue beyond the known achievement assessments. There are studies confirming a positive correlation between positive self-concepts and higher academic achievement in school-age children with intellectual disabilities (Maiano et al., 2018). The findings suggest that self-concept plays a crucial role in academic achievement for children with intellectual disabilities. It is also argued that the social and communication skills challenges experienced by many students with intellectual disabilities can be positively affected by inclusive education where they have similar opportunities to learn alongside typically developing classmates (Kuntz & Carter, 2019). Siperstein et al. (2009) further reported that children with mild intellectual disabilities are generally well accepted by their peers in inclusive or co-learning environments, and that such social interactions can facilitate the development of their communication skills. This shows the importance of social and inclusive environments in supporting the holistic development of children with intellectual disabilities.

The improvement in the learning outcomes of students with intellectual disabilities attending both educational environments is directly related to the arrangements made in the information processing processes. This result of the study is not consistent with the results of other studies in the literature (Blasi, et al., 2007; Sterkenburg et al., 2022). Although the relationship between the academic performance of these children and information processing processes has been demonstrated, the results of some studies show that this is not a single indicator. Thus, it is emphasized that the learning outcomes of students with intellectual disabilities in mainstream and inclusive educational settings is a combination of factors such as self-concept, instructional models, socio-emotional context, and cognitive abilities, in addition to information processing. Therefore, improvements in academic achievement cannot be attributed solely to adaptations in information processing, but require a holistic approach that considers the diverse needs and abilities of these students. Cognitive training programs that target attention can lead to broad improvements in

related domains (Kirk et al., 2015), but the academic performance of these students is influenced by a variety of factors (Falk & Sansour, 2024) beyond information processing. For example, one study found that all students showed significant increases in achieving academic goals when trained using the Self-Determined Learning Model of Instruction (Shogren et al., 2011). These findings suggest that academic achievement in students with intellectual disabilities may be influenced by instructional models and autonomy.

5. Conclusions

In the study, teachers in both groups of participants (special education teachers and classroom teachers) indicated that they evaluated the information processing processes of students with intellectual disabilities. Accordingly, special education teachers stated that they evaluated knowledge input (determining learning level, determining specific instructional goals, and evaluating at regular intervals) and output (monitoring student development, measuring retention, and measuring generalization) from the knowledge processing processes of children with intellectual disabilities. Classroom teachers, on the other hand, stated that they evaluated the information processing processes of children with intellectual disabilities in three main themes: input (simple activities appropriate to their level), output (evaluating gains), and processing (transition to the next skill, determining the level of understanding of the subjects, support education, and subject repetition). It is also suggested by some researchers (Kirk et al., 2022) that teachers should consider information processing processes when supporting the learning processes of these children.

Special education teachers reported that they measured the level of success of children with intellectual disabilities in processing information, assessed knowledge acquisition, assessed to inform parents, assessed concrete data, assessed prior learning, assessed to teach a new skill, assessed to provide feedback, and assessed to plan the educational program. Elementary school teachers also reported that they identified literacy skills, assessed to move to the next skill, assessed to provide feedback, assessed progress, assessed to develop new methods, and assessed to determine the level of program implementation. The information processing theory outlines three important processes in learning information: information input, information processing, and information output. Information input refers to the process by which information is sensorially acquired through attention and perception. Information processing refers to the process by which information is transferred from short-term memory to long-term memory through processes such as evaluation, association, and classification. The output of knowledge can be expressed as the behavioral demonstration of the learned knowledge. The results of this study show that the evaluative behavior of the teachers in both groups could not evaluate any of the processes of information processing theory. In order for children with intellectual disabilities to learn information in a permanent way, it is necessary to evaluate the information processing processes and make some arrangements and adaptations accordingly. For instance, Numminen et al. (2000) underscore the significance of the organization of working memory in people with intellectual disabilities, stating that targeted interventions are necessary to promote the cognitive mechanisms essential to learning and memory recall.

Another finding of the study is the accommodations and adaptations made by teachers in both groups for information processing. In the study, special education teachers supported the information processing of students with intellectual disabilities under four different main themes: preparation, input, processing, and output. Special education teachers stated that they supported the preparation process with videos and games, arranging the seating area, arranging dangerous tools and equipment, arranging the temperature and light of the classroom, meeting with parents, and providing guidance support. In the process of providing information, they reported that they supported by using materials, eliminating distractions, and using smart boards. In processing information, they indicated that they decide to eliminate distractions, selected appropriate materials, provided motivation, provided repetition, did level-appropriate activities, created a

learning environment through experience, and did drama activities. In information output, they stated that they planned to apply the instructions incompletely, to make a general assessment test, to measure with different assessment tools, and to make arrangements according to the type of skill. In order to support the information processing processes of students with intellectual disabilities, elementary school teachers supported the information processing activities under four different main themes: preparation process, input, processing, and output. Elementary school teachers reported that they used an individualized curriculum, read graded texts, and implemented graded activities during the preparation process. Elementary school teachers reported that they made arrangements for information input by engaging children's attention, supporting them with materials, conducting hands-on activities, supporting peer play, using visual and auditory applications, and using teaching techniques. In the arrangements for processing information, they stated that they used different activities, used different teaching methods, included memory games, conducted mutual interviews, exemplified the topics, conducted experience-based activities, and made repetitions. In the regulation of information output, they stated that they assessed students' behavior, received feedback from activities, made cross-sectional assessments, and evaluated the results. This finding of the study shows that both special education teachers and primary education teachers do not make effective arrangements for the processes of information input, information processing, and information output. It also shows that the knowledge levels of teachers in both groups about the information processing processes and their practices in this context do not differ.

Supporting the information processing of children with intellectual disabilities in learning skills and knowledge is crucial. The role and responsibility of teachers in teaching these students is vital. Therefore, teachers must consider the limitations of children with intellectual disabilities in information input and processing while supporting their learning processes. Additionally, teachers should be aware of the necessary adjustments and accommodation required in information processing procedures. However, the study's findings indicate that teachers possess significant deficiencies in this area. It is of utmost importance for teachers working with students who have intellectual disabilities to continue improving and addressing their shortcomings. In addition, school-based strategies for improving teachers' professional behavior and protocols for intervening in such special cases need to be developed.

6. Limitations and Suggestions

The fact that the study was conducted with children with intellectual disabilities can be considered a limitation. Therefore, the study should be conducted with larger participant groups by including different disability groups.

This study reveals the limitations in the information processing of children with intellectual disabilities and emphasizes the importance of teachers making accommodations to reduce these limitations. The findings show that special education teachers and elementary school teachers generally do not understand the information processing processes of children with intellectual disabilities and do not make effective accommodations for these processes. The study reveals that the academic performance of children with intellectual disabilities is generally low due to poor cognitive skills. Moreover, students with intellectual disabilities in segregated and mainstream educational settings have similar academic performance. However, both groups of teachers were observed not to have made appropriate arrangements for the information processing of these students and did not adequately focus on information processing processes in general. As such, teachers are strongly encouraged to attend training to support their professional skills related to information processing. In addition, teachers were found to be inadequate in assessing and supporting the information processing efforts of children with intellectual disabilities. Therefore, they are recommended to evaluate their students' information processing at the beginning of the instructional period, adjust instructional goals accordingly, and use effective instructional strategies. In conclusion, our research findings suggest that teachers need more training and

knowledge to understand and support the learning processes of children with intellectual disabilities. Therefore, teachers need to focus on cognitive processes in order to develop and implement effective instructional strategies to support information processing in children with intellectual disabilities. In addition, more research is needed to support the information processing of children with learning disabilities, especially those with intellectual disabilities, autism, and other special needs. In addition, more evidence is needed and variables that affect information processing need to be identified.

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References

- Abu-Alghayth, K., Catania, N., Semon, S., Lane, D., & Cranston-Gingras, A. (2022). A brief history of special education policy on the inclusion of students with intellectual disabilities in Saudi Arabia. *British Journal of Learning Disabilities*, 50(2), 178–187. <https://doi.org/10.1111/bld.12468>
- Adams, J. W., & Hitch, G. J. (2022). Children's mental arithmetic and working memory. In A. A. Adams & J. G. Hitch (Eds.), *The development of mathematical skills* (pp. 153–173). Psychology Press.
- Alam, A. (2022). Mapping a sustainable future through conceptualization of transformative learning framework, education for sustainable development, critical reflection, and responsible citizenship: An exploration of pedagogies for twenty-first century learning. *ECS Transactions*, 107(1), Article 9827. <https://doi.org/10.1149/10701.9827ecst>
- Avramidis, E., & Norwich, B. (2002). Teachers' attitudes towards integration/inclusion: A review of the literature. *European Journal of Special Needs Education*, 17(2), 129–147.
- Ayre, C., & Scally, A. J. (2014). Critical values for Lawshe's Content Validity Ratio: Revisiting the original methods of calculation. *Measurement and Evaluation in Counseling and Development*, 47, 79–86.
- Baker, S. K., & Zigmond, N. (2009). Are regular education classes equipped to accommodate students with learning disabilities? *Exceptional Children*, 75(3), 301–318. <http://doi.org/10.1177/001440299005600603>
- Blasi, F., Elia, F., Buono, S., Ramakers, G., & Nuovo, S. (2007). Relationships between visual-motor and cognitive abilities in intellectual disabilities. *Perceptual and Motor Skills*, 104(3), 763–772. <https://doi.org/10.2466/pms.104.3.763-772>
- Cole, C. M., Waldron, N., & Majd, M. (2004). Academic progress of students across inclusive and traditional settings. *Mental Retardation*, 42(2), 136–44. [http://doi.org/10.1352/0047-6765\(2004\)42<136:APOSAI>2.0.CO;2](http://doi.org/10.1352/0047-6765(2004)42<136:APOSAI>2.0.CO;2)
- Dessementet, R. S., Bless, G., & Morin, D. (2012). Effects of inclusion on the academic achievement and adaptive behaviour of children with intellectual disabilities. *Journal of Intellectual Disability Research*, 56(6), 579–587. <https://doi.org/10.1111/j.1365-2788.2011.01497.x>
- Eggen, P. (2020). *Information processing and human memory*. Oxford research encyclopedia of education. <https://doi.org/10.1093/acrefore/9780190264093.013.864>

- England-Mason, G., & Dewey, D. (2023). Executive function in children and adolescents: A concept in need of clarity. In J. L. Matson (Ed.), *Handbook of clinical child psychology, autism and child psychopathology series* (pp. 235–268). Springer. https://doi.org/10.1007/978-3-031-24926-6_13
- Eysenbach, G., & Köhler, C. (2022). How do consumers search for and appraise health information on the world wide web? Qualitative study using focus groups, usability tests, and in-depth interviews. *Bmj*, 324, 573–577.
- Falk, K., & Sansour, T. (2024). Self-concept and achievement in individuals with intellectual disabilities. *Disabilities*, 4(2), 348–367. <https://doi.org/10.3390/disabilities4020023>
- Forlin, C., & Chambers, D. (2011). Teacher preparation for inclusive education: Increasing knowledge but raising concerns. *Asia-Pacific Journal of Teacher Education*, 39(1), 17–32.
- Gheysens, E., Griful-Freixenet, J., & Struyven, K. (2023). Differentiated instruction as an approach to establish effective teaching in inclusive classrooms. In R. Maulana, M. Helms-Lorenz & R. M. Klassen, (Eds.), *Effective teaching around the world* (pp. 678–693). Springer.
- Glesne, C. (2013). *Becoming qualitative researchers: An introduction*. Pearson/ Allyn & Bacon.
- Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (pp. 105–117). Sage.
- Gunderson, J., Higgins, K., Morgan, J., Tandy, R., & Brown, M. (2017). Cognitively accessible academic lessons for students with intellectual disabilities using the iPad. *Journal of Special Education Technology*, 32(4), 187–198. <https://doi.org/10.1177/0162643417715750>
- Haeghele, J. A., & Park, S. Y. (2016). Utilizing generalization tactics to promote leisure-time physical activity for students with intellectual disabilities. *Strategies*, 29(4), 19–23.
- Hronis, A., Roberts, L., & Kneebone, I. I. (2017). A review of cognitive impairments in children with intellectual disabilities: Implications for cognitive behaviour therapy. *British Journal of Clinical Psychology*, 56(2), 189–207.
- Jacobs, E., Simon, P., & Nader-Grosbois, N. (2020). Social cognition in children with non-specific intellectual disabilities: An exploratory study. *Frontiers in psychology*, 11, 1884
- Jacobs, E., & Nader-Grosbois, N. (2020). Training social information processing in elementary school children with intellectual disabilities: A key to support their emotion regulation and social behaviors. *Journal of Education and Training Studies*, 8(6), 7–22. <https://doi.org/10.11114/jets.v8i6.4840>
- Johnson, L., & Brown, T. (2007). The development of an instrument for measuring re-service teachers' sentiments, attitudes, and concerns about inclusive education. *International Journal of Special Education*, 22(2), 150–159.
- Kiani, R., & Miller, H. (2010). Sensory impairment and intellectual disability. *Advances in Psychiatric Treatment*, 16(3), 228–235. <https://doi.org/10.1192/apt.bp.108.005736>
- Kirk, H., Gray, K., Riby, D., & Cornish, K. (2015). Cognitive training as a resolution for early executive function difficulties in children with intellectual disabilities. *Research in Developmental Disabilities*, 38, 145–160. <https://doi.org/10.1016/j.ridd.2014.12.026>
- Kirk, S., Gallagher, J. J., & Coleman, M. R. (2022). *Educating exceptional children*. Cengage Learning.
- Kleinert, H., Towles-Reeves, E., Quenemoen, R., Thurlow, M., Fluegge, L., Weseman, L., & Kerbel, A. (2015). Where students with the most significant cognitive disabilities are taught. *Exceptional Children*, 81(3), 312–328. <https://doi.org/10.1177/0014402914563697>
- Kluth, P., & Straut, D. (2003). Toward standards for diverse learners: Examining assumptions. In P. Kluth, D. Straut, & D. P. Biklen (Eds.), (Eds.), *Access to academics for all students* (pp. 26–44). Lawrence Erlbaum Associates.
- Kuntz, E., & Carter, E. (2019). Review of interventions supporting secondary students with intellectual disability in general education classes. *Research and Practice for Persons with Severe Disabilities*, 44(2), 103–121. <https://doi.org/10.1177/1540796919847483>
- Lawshe, C. H. (1975). A quantitative approach to content validity. *Personnel Psychology*, 28, 563–575. <http://dx.doi.org/10.1111/j.1744-6570.1975.tb01393.x>
- Lestyanawati, R. (2020). The strategies and problems faced by Indonesian teachers in conducting e-learning during COVID-19 outbreak. *Culture, Literature, Linguistics, and English Teaching*, 2(1), 71–82. <https://doi.org/10.32699/cllient.v2i1.1271>
- Lindner, K. T., & Schwab, S. (2020). Differentiation and individualisation in inclusive education: a systematic review and narrative synthesis. *International Journal of Inclusive Education*, 29(12), 2199–2219. <https://doi.org/10.1080/13603116.2020.1813450>

- Maiano, C., Coutu, S., Morin, A., Tracey, D., Lepage, G., & Moullec, G. (2018). Self-concept research with school-aged youth with intellectual disabilities: A systematic review. *Journal of Applied Research in Intellectual Disabilities*, 32(2), 238–255.
- Marshall, C., & Rossman, G. B. (2014). *Designing qualitative research*. Sage.
- Maxwell, J. A. (2008). Designing a qualitative study. In L. Bickman & D. J. Rog (Eds.), *The Sage handbook of applied social research methods* (2nd ed., pp. 214–253). Sage.
- Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation*. Jossey-Bass.
- Mihajlovic, C. (2020). Special educators' perceptions of their role in inclusive education: A case study in Finland. *Journal of Pedagogical Research*, 4(2), 83–97. <http://dx.doi.org/10.33902/JPR.2020060179>
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*. Sage.
- Nilsson, K., Danielsson, H., Elwér, A., Messer, D., Henry, L., & Samuelsson, S. (2021). Investigating reading comprehension in adolescents with intellectual disabilities: evaluating the simple view of reading. *Journal of Cognition*, 4(1), 56. <https://doi.org/10.5334/joc.188>
- Njelesani, J., Mlambo, V., Deneke, T., & Hunleth, J. (2022). Inclusion of children with disabilities in qualitative health research: A scoping review. *PloS One*, 17(9), e0273784
- Numminen, H., Service, E., Ahonen, T., Korhonen, T., Tolvanen, A., Patja, K., & Ruoppila, I. (2000). Working memory structure and intellectual disability. *Journal of Intellectual Disability Research*, 44(5), 579–590. <https://doi.org/10.1046/j.1365-2788.2000.00279.x>
- O'Mara, S. M., Sanchez-Vives, M. V., Brotons-Mas, J. R., & O'Hare, E. (2009). Roles for the subiculum in spatial information processing, memory, motivation and the temporal control of behaviour. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*, 33(5), 782–790. <https://doi.org/10.1016/j.pnpbp.2009.03.040>
- Patton, M. (2014). *Qualitative research and evaluation methods*. Sage.
- Pope, C., Ziebland, S., & Mays, N. (2000). Qualitative research in health care Analysing qualitative data. *BMJ*, 320(7227), 114–116. <https://doi.org/10.1136/bmj.320.7227.114>
- Rubinstein, R., & Brown, R. (1984). An evaluation of the validity of the diagnostic category of ADD. *The American Journal of Orthopsychiatry*, 54, 398–414. <https://doi.org/10.1111/j.1939-0025.1984.tb01506.x>
- Saracho, O. N. (2023). Theories of child development and their impact on early childhood education and care. *Early Childhood Education Journal*, 51(1), 15–30. <https://doi.org/10.1007/s10643-021-01271-5>
- Schalock, R. L., Luckasson, R., & Tasse, M. J. (2021). An overview of intellectual disability: Definition, diagnosis, classification, and systems of supports. *American Journal on Intellectual and Developmental Disabilities*, 126(6), 439–442. <https://doi.org/10.1352/1944-7558-126.6.439>
- Schnepel, S., Krähenmann, H., Sermier Dessemontet, R., & Opitzet, E. M. (2020). The mathematical progress of students with an intellectual disability in inclusive classrooms: results of a longitudinal study. *Mathematics Education Research Journal*, 32, 103–119. <https://doi.org/10.1007/s13394-019-00295-w>
- Schuengel, C., van Rest, M. M., Stanford, C. E., & Hastings, R. P. (2019). Impact of research about the early development of children with intellectual disability: A science mapping analysis. *Frontiers in Education*, 4, 41. <https://doi.org/10.3389/educ.2019.00041>
- Seidman, I. (2006). *Interviewing as qualitative research: A guide for researchers in education and the social sciences*. Teachers College Press.
- Shevlin, H. (2020). Current controversies in the cognitive science of short-term memory. *Current Opinion in Behavioral Sciences*, 32, 148–154. <https://doi.org/10.1016/j.cobeha.2020.02.005>
- Shogren, K., Palmer, S., Wehmeyer, M., Williams-Diehm, K., & Little, T. (2011). Effect of intervention with the self-determined learning model of instruction on access and goal attainment. *Remedial and Special Education*, 33(5), 320–330. <https://doi.org/10.1177/0741932511410072>
- Silverman, D. (2016). *Qualitative research*. Sage.
- Siperstein, G. N., Glick, G. C., & Parker, R. C. (2009). Social inclusion of children with intellectual disabilities in a recreational setting. *Intellectual and Developmental Disabilities*, 47(2), 97–107. <https://doi.org/10.1352/1934-9556-47.2.97>
- Sterkenburg, P., Ilic, M., Flachsmeier, M., & Sappok, T. (2022). More than a physical problem: The effects of physical and sensory impairments on the emotional development of adults with intellectual disabilities. *International Journal of Environmental Research and Public Health*, 19(24), 17080.
- Strauss, A. L., & Corbin, J. (1990). *Basics of qualitative research: Grounded theory procedures and techniques*. Sage.
- Totsika, V., Liew, A., Absoud, M., Adnams, C., & Emerson, E. (2022). Mental health problems in children with intellectual disability. *The Lancet Child & Adolescent Health*, 6(6), 432–444. [https://doi.org/10.1016/S2352-4642\(22\)00067-0](https://doi.org/10.1016/S2352-4642(22)00067-0)

- Van Nieuwenhuijzen, M., Orobio de Castro, B., Wijnroks, L., Vermeer, A., & Matthys, W. (2007). The relations between intellectual disabilities, social information processing, and behaviour problems. *European Journal of Developmental Psychology*, 1(3), 215–229. <https://doi.org/10.1080/17405620444000111>
- Van Nieuwenhuijzen, M., & Vriens, A. (2012). Cognitive skills and social information processing in children with mild to borderline intellectual disabilities. *Research in Developmental Disabilities*, 33(2), 426–434. <https://doi.org/10.1016/j.ridd.2011.09.025>
- Van Nieuwenhuijzen, M., Vriens, A., Scheepmaker, M., Smit, M., & Porton, E. (2011). The development of a diagnostic instrument to measure social information processing in children with mild to borderline intellectual disabilities. *Research in Developmental Disabilities*, 32(1), 358–370. <https://doi.org/10.1016/j.ridd.2010.10.012>
- Vicari, S., & Carlesimo, G. A. (2002). Children with intellectual disabilities. In A. D. Baddeley, M. D. Kopelman, & B. A. Wilson (Eds.), *The handbook of memory disorders* (pp. 501–520). John Wiley & Sons.
- Wickens, C. D., & Carswell, C. M. (2021). Information processing. In G. Salvendy & C. M. Karwowski (Eds.), *Handbook of human factors and ergonomics* (pp. 114–158). John Wiley & Sons. <https://doi.org/10.1002/9781119636113.ch5>
- Yılmaz, E., & Yılmaz, T. (2024). A systematic analysis of studies on reading skills with specific learning disabilities: The case of Türkiye. *International Journal of Didactical Studies*, 5(2), 26230. <https://doi.org/10.33902/ijods.202426230>
- Yin, R. (1984). *Case study research: Design and methods*. Sage.