Mimarlık ve Yaşam Dergisi
Journal of Architecture and Life
10(2), Ağustos Sayısı, 2025, (293-305)
ISSN: 2564-6109
DOI: 10.26835/my.1609178

Research Article

Psychology & Architecture: Improving Learning Spaces for Intellectually Disabled Children**

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Abstract

Children with intellectual disabilities differ considerably from other children in physical, mental, behavioral and social terms. This research aims to identify and investigate the factors that lead to the creation of a special quality in the architectural design of educational spaces for such children. This quality should be in accordance with the characteristics of these children so that they can effectively use their maximum abilities. For this purpose, 80 students with intellectual disabilities from two schools were studied. A survey was used, and the collected data was analyzed using the "Chi-Square" test in SPSS. The results showed that factors such as materials, sound, colors, and proportions in educational spaces have a significant influence on the quality of these environments. Also, children with intellectual disabilities are often confused and anxious; so, architectural design can help to improve their behavior by using soft and curved shapes, colors, dimensions, and proportions of the environment. Given the positive impact that architectural environments can have on the growth process of children with intellectual disabilities, the design of educational spaces is therefore particularly important and such environments should be safe, calm and stimulating.

Keywords: Intellectual Disabilities, Children, Educational Spaces, Architectural Quality

Psikoloji ve Mimarlık: Zihinsel Engelli Çocuklar için Eğitim Mekanlarının Geliştirilmesi

Öz

Zihinsel engelli çocuklar fiziksel, zihinsel, davranışsal ve sosyal açıdan diğer çocuklardan önemli ölçüde farklılık göstermektedir. Bu araştırma, bu tür çocuklar için eğitim alanlarının mimarisinde özel bir nitelik yaratılmasına yol açan faktörleri belirlemeyi ve araştırmayı amaçlamaktadır. Bu nitelik, bu çocukların özelliklerine uygun olmalıdır ki maksimum yeteneklerini etkili bir şekilde kullanabilsinler. Bu amaçla, iki özel eğitim okuldan 80 zihinsel engelli öğrenci üzerinde araştırma gerçekleştirilmiştir. Bir anket çalışması uygulanmış ve SPSS programında “Ki-Kare” testi kullanılarak analiz edilmiştir. Bulgular, eğitim alanlarındaki malzeme, ses, renk ve oran gibi faktörlerin bu ortamların kalitesi üzerinde önemli bir etkiye sahip olduğunu göstermiştir. Sonuçlar ayrıca zihinsel engelli çocukların genellikle şaşkın ve endişeli olduklarını göstermiştir; bu nedenle mimari tasarım, mekânda yumuşak ve eğik çizgileri, renkleri, boyutları ve oranları dikkatlice kullanarak davranışlarını iyileştirmeye yardımcı olabilir. Mimari mekanların zihinsel engelli çocukların gelişme süreci üzerinde olumlu bir etkisi olabileceği göz önüne

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** The Concerned Research was carried out with the permission of the Konya Food and Agriculture University Scientific Research and Publication Ethics Board, decision numbered 2023/05-02 dated 04.09.2023.

Received Date / Gönderim Tarihi: 29.12.2024
Accepted Date/Kabul Tarihi: 27.06.2025

alındığında, eğitim alanlarının tasarımı bu nedenle özellikle önemlidir ve bu tür ortamlar aynı anda güvenli, sakin ve uyarıcı olmalıdır.

Anahtar Kelimeler: Zihinsel Engelli, Çocuk, Eğitim Alanları, Mimari Nitelik

1. Introduction

Children with intellectual disabilities have different needs than other children because of their physical, mental, behavioral and social characteristics. These differences not only affect their learning process but should also be taken into account when designing educational spaces (Raty et al., 2016, p. 322). As the educational environment plays a key role in the development of these children's social skills and learning, it seems necessary to design an appropriate space that responds to their specific needs. Appropriate design of educational spaces for children with intellectual disabilities can facilitate learning, improve social interactions and enhance the quality of life of these children. Therefore, creating spaces that meet the special needs of these children has become one of the most important challenges in the field of architecture and interior design (Jebril & Chen, 2021, p. 827). Several studies have been conducted on the influence of the environment on the behavior and learning of children with intellectual disabilities. Research shows that environmental features such as light, color, acoustics, and spatial arrangement can have profound effects on the behavior and learning of children with intellectual disabilities (Lekan-Kehinde & Asojo, 2021, p. 5). Dul and Weerdmeester (2008) emphasize that environments incorporating sensory-sensitive elements can mitigate anxiety and behavioral disturbances in special education settings. Likewise, Küller et al. (2009) demonstrate that optimized lighting and sound conditions enhance emotional regulation and sustained attention among neurodiverse populations. The presence of open spaces and the use of natural light instead of artificial light in educational spaces can have a positive effect on children's mood and give them a sense of calm and comfort (Meng et al., 2023, p. 9). The combination of suitable furniture and the choice of soft colors can also increase concentration, reduce anxiety and improve the attention of these children (Godwin et al., 2022, p. 243).

Recent architectural research underscores the significance of holistic, child-centered environments that positively influence cognitive development and emotional regulation, beyond individual sensory and cognitive considerations. For example, Barrett et al. (2013) emphasize that spatial organization, lighting, and furniture arrangement in classrooms significantly affect students' academic performance. Kraftl (2008) contends that everyday environmental features such as textures, natural light, and materiality provide passive lessons that influence children's learning and behavior. Ferguson (2008) further highlights that children with cognitive impairments benefit from spatial legibility, predictable layouts, and calming visual fields that reduce confusion and overstimulation. Additionally, Woolner (2015) and Benade (2019) advocate for inclusive architectural strategies, including clearly defined zones, flexible layouts, and sensory-sensitive materials, as essential elements for creating equitable learning environments. Dudek (2012) also emphasizes the importance of safe, stimulating, and adaptive environments in special education contexts. Imms et al. (2016) discuss how innovative spatial design like featuring adaptable furniture, acoustic zoning, and biophilic elements can enhance sensory integration and cognitive processing for learners with special needs.

According to Papadopoulos (2021), special education is more suited for exceptional children than mainstream education since they differ greatly from typical children in their physical, behavioral, and mental traits. According to Gierczyk and Hornby (2021), exceptional children are those that require special instruction to reach their full potential.

They contend that moving individuals with intellectual impairments from a restrictive and inappropriate setting to one with less limitations frequently improves their adaptability, activity patterns, or behavioral traits. Children with intellectual disabilities are limited in their ability to move, sense their surroundings, and have strong bodies. These children's physical and mental health greatly improve with regular physical activity (Totsika et al., 2022, p. 432). A suitable environment is necessary for the normal development of children with intellectual disabilities. In this respect, the learning environment plays an essential role in the development of the talents and individual abilities of these children. The probability of intellectual and behavioral difficulties increases with a child's age and the length of time they spend in an inappropriate setting. These circumstances may complicate the learning process and increase the amount of time needed for efficient learning (Kauffman & Hung, 2009, p. 454). Distinct individual spaces should be taken into consideration in classrooms to accommodate the requirements of students with attention deficit disorder and emotional issues, who frequently require physical and auditory separation of areas to decrease distraction and inattention between activities (Reid, 2017, p. 11). Desks for individuals or groups of students are helpful for a variety of tasks, including class discussions, small group projects, and solo work. School equipment should have rounded edges and non-glossy surfaces to maximize comfort and reduce possible risks like eye strain and distraction. Furthermore, children with disabilities should have their mobility distances reduced because getting pupils from one place to another is always regarded as a crucial part of providing school facilities. Compared to typical students, students with disabilities spend a lot more time moving between locations (Supriyadi, 2023, p. 1831).

According to the numerous studies conducted on children with intellectual disabilities, these youngsters are extremely vulnerable and need special attention. In the social, educational, and home contexts, they require particular behaviors and situations. The development of an architectural solution for special educational facilities that serves as a basis for their optimal use is therefore just as important for the present study as an understanding of mentally disabled children and their basic educational needs. This study aims to explore and provide innovative architectural ideas for the design of special school facilities. Research tries to propose a framework for designing inclusive and productive learning environments by coordinating architectural principles with the basic educational needs of children with intellectual disabilities. The methodological approach combines an examination of existing research on these children's cognitive and behavioral needs with an assessment of architectural components that can meet these demands. Through this integration, the study aspires to contribute to the corpus of knowledge that bridges the gap between psychology and design, ultimately assisting in the creation of environments that empower and nurture vulnerable youth.

2. Method

The present study focuses on two main areas: architectural design and the psychology of exceptional children. Given the interdisciplinary approach of the study, the psychology of mentally handicapped children was chosen as the appropriate context for formulating the research hypothesis. Based on the principles and theories stated in the introduction, this study employed a survey method. The goal was to generalize the results from a small sample to the complete statistical population. As survey data is suitable for quantitative analysis, the data was analyzed both descriptively and explanatorily, with information acquired via a questionnaire. Cronbach’s alpha was used to assess the validity of the questionnaire. The questionnaire's validity was established by a pilot study of 20 individuals (10 women and 10 males). The questionnaire data was analyzed using SPSS software, including Pearson correlation tests and one-sample t-tests ($p<0.01$).

Confirmatory factor analysis was carried out utilizing structural equation modeling. Cronbach's alpha test revealed that the questionnaire has a reliability of 0.861. Descriptive and inferential statistics were used. In the descriptive statistics, the absolute frequency and the relative frequency were used to analyze the data; in the inferential statistics, the chi-square test was used. The statistical population was 80 students with intellectual disabilities in the second (10 females & 10 males), third (10 females & 10 males), fourth (10 females & 10 males) and fifth (10 females & 10 males) grades who were educated in two public schools in 2023. The participants were selected using a systematic and regular sampling method. The test groups differed in terms of age, but not significantly in terms of IQ.

To obtain accurate data and identify architectural factors that influence the quality of the educational environment for children with intellectual disabilities, a questionnaire was designed purposefully and with an interdisciplinary approach. The perspective of a child psychologist specializing in the education of exceptional children was used to carefully examine the psychological and professional aspects related to the needs of this group and to ensure that the questions not only address the architectural aspects of the environment but also consider the psychological and behavioral dimensions of the children. The main aim in developing this questionnaire was to gain a deeper understanding of the attitudes and responses of children with intellectual disabilities to environmental factors. To this end, an attempt was made to identify the dos and don'ts of the environment that affect children's sense of calm, concentration and ability to learn.

This approach, based on the principle of close interaction between architecture and child psychology, enabled a deeper investigation of children's responses to environmental elements such as open space, color, geometry and form, materials and texture. Ultimately, the questionnaire was structured to provide comprehensive and practical information both for the design of educational environments and for improving the quality of life and learning of children with intellectual disabilities. In this respect, five questions were asked. The first question – *How would you like to design your classroom?* – was addressed to investigate concentration in the classroom. The second question – *In which part and in which place of the school would you prefer to spend time?* – was designed to determine the importance of open spaces and landscaping. The third question – *Which of the following shapes would you like your school to look like?* – aimed to determine the degree of mental challenge students faced in recognizing spatial organization. The fourth question – *What material do you think the school walls should be made of?* – aimed to assess the impact of the environmental design on the nature of the children's impairment, such as the level of anxiety, excitement or calmness6 when looking from the inside out. Question five – *What color would you like to see used more in your school and classrooms?* – was addressed to explore the impact of color on children's psychological and behavioral states. The study was conducted individually by the author to create a warm and intimate environment and a sense of security for students after gaining the attention of the teachers and the cooperation of the school principal. The survey was completed for two days, and each survey took 5–7 minutes to complete. The SPSS software was used to calculate the acceptance coefficient, and data analysis. Participants were informed in detail about the experimental procedure.

3. Findings and Discussion

To acquire a meaningful contribution to the evaluation of the quality of the school environment by children with intellectual disabilities, the data collected was subjected to both a descriptive and an inferential analysis. The descriptive analysis provided an overview of patterns and trends in the data, such as the identification of common

perceptions, preferences and challenges reported by the children. These findings offered insights into the general characteristics of the educational spaces that either facilitated or hindered their learning experiences. Inferential analysis, on the other hand, made it possible to analyze correlations and thus to identify statistically significant factors that influence children's perception of quality. This approach made it possible to assess how different architectural and environmental variables affected children's comfort, engagement and overall satisfaction. By applying this dual framework of analysis, the study aimed to provide a comprehensive understanding of how environmental design affects the educational experiences of children with intellectual disabilities and pave the way for evidence-based recommendations to improve these spaces.

The results show that 83% of the students ($M=28.37$, $SD=6.52$, $p<0.01$) prefer a quiet classroom, while only 17% ($M=24.66$, $SD=5.2$, $p<0.01$) opt for a crowded room. This data shows the importance of concentration in the classrooms of children with intellectual disabilities. One of the most fundamental challenges for these children is learning difficulties and problems maintaining concentration, which can be greatly affected by the physical environment of the classroom. From a psychological perspective, it can be recognized that quiet spaces without additional stimuli can help to reduce sensory overload and prevent these children from becoming mentally distracted (Smogorzewska et al., 2019, p. 1247). Distracting factors such as visual cluster, unwanted noise or excessive complexity in the design can distract children and make the learning process more difficult. Therefore, the architectural design of educational spaces for this group should pay particular attention to the principles of minimalism in interior design, the use of calming colors and the creation of order in the layout. On the other hand, such designs not only increase children's concentration, but can also improve their sense of security and calm, which is of great psychological importance for children with intellectual disabilities. To achieve these goals, it is necessary to utilize architectural solutions such as reducing the number of unnecessary elements, designing predictable spaces and creating quiet areas to rest and regain concentration. These considerations can improve the quality of learning and provide better opportunities for children's cognitive and behavioral development.

As can be seen in Figure 1, when children with intellectual disabilities were asked where they preferred to spend time in the school environment, 69% of children ($M=26.13$, $SD=5.58$, $p<0.01$) chose the yard and 31% ($M=20.14$, $SD=4.9$, $p<0.01$) chose the classroom. These statistics show that open spaces, especially the schoolyard, play an important role in the preferences of children with intellectual disabilities. It can be concluded that activities such as games, rhythmic sports and group interactions can have a significant impact on the social and behavioral development of these children. These activities, which are often carried out in open school spaces, not only help to improve motor skills and physical coordination but also provide opportunities to strengthen social relationships and develop communication skills (Pawlowski et al., 2023, p. 8). From a psychological perspective, outdoor play and physical activities allow children with intellectual disabilities to escape the stress of classroom learning and experience a sense of freedom and self-expression. Such environments can facilitate informal interactions and group play and enhance children's sense of belonging and participation. In addition, outdoor spaces provide opportunities for experiential learning, which is very effective for these children as they respond better to concrete and hands-on learning methods (Sit et al., 2007, p. 429). Furthermore, these results suggest that architects and environmental designers should pay particular attention to the quality of open school spaces. Elements such as safe flooring, green spaces, accessible routes and play equipment tailored to the needs of these children should be prioritized. Creating spaces that simultaneously support collective and individual activities can also help to increase

children's participation and strengthen their social and cognitive skills. Taking these aspects into account when designing the school environment not only provides a richer experience for children with intellectual disabilities but also gives parents and educators more confidence in the well-being and progress of these children.

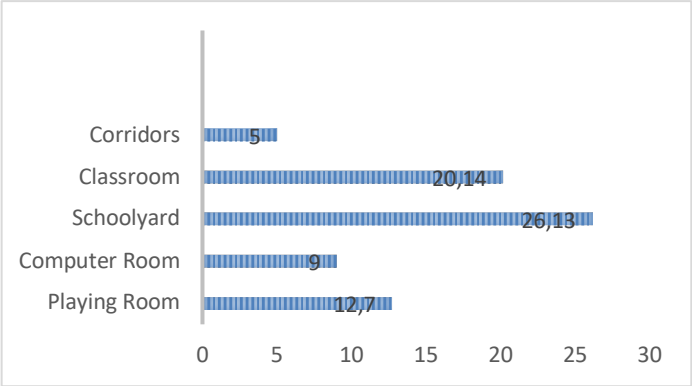

Figure 1. Frequency Distribution of Preferred (Author)

Based on Table 1, the results show that when asked which of the following shapes would you like your school to look like?, 74% of respondents (M=27.34, SD=6.31; M=25.71, SD=6.01, $p<0.01$) chose the shapes with smooth and curved lines, while only 26% (M=21.61, SD=4.71; M=18.94, SD=3.62, $p<0.01$) preferred the shapes with broken lines. Such pattern suggests that children with intellectual disabilities are more comfortable with curved shapes and smooth lines. This is because such shapes are easier to understand and process in their minds, which reduces cognitive complexity and reduces stress when interacting with the environment (Wickstrom & Pelletier, 2019, p. 911). From a psychological perspective, soft and curved lines are known to be calming and non-invasive elements that can increase children's sense of safety and comfort. These types of shapes facilitate concentration and improve the sense of control over the environment by reducing visual and mental stimulation. In contrast, broken lines and angular shapes can be challenging for children with intellectual disabilities as they create a sense of clutter or intrusion on visual perception (Berlin et al., 2017, p. 6). These findings emphasize the importance of designing environments with simple and predictable shapes that are better suited to the mental processing of children with intellectual disabilities. From an architectural point of view, this result could be a turning point for architects and designers of educational environments. Using curved lines in the design of indoor and outdoor spaces, especially in furniture, walls, ceilings and movement paths, can provide a more harmonious and enjoyable experience for these children. In addition, soft and dynamic shapes can enhance the sense of flow and movement in space and facilitate communication between the different parts of the educational environment. In addition to increasing comfort and relaxation, this design approach can lead to greater efficiency of spaces and the creation of environments that contribute to the intellectual, emotional and behavioral development of children with intellectual disabilities. Taking such considerations into account when designing therefore not only meets the specific needs of this group of children but is also a humane and inclusive standard for the design of educational environments.

Table 1. Inferential Analysis of Shape Preference (Author)

Shape	Type	M	SD	Prob. Level
Rectangle	Broken line	21.61	4.71	0.000
Circle	Curved line	27.34	6.31	0.000
Triangle	Broken line	18.94	3.62	0.000
Ellipse	Broken line	25.71	6.01	0.000

In addition, according to Table 1, there is a significant correlation between the choice of geometric shapes (square, circle, rectangle and triangle) and the type of architectural lines (curved and interrupted). This finding suggests that the minds of children with intellectual disabilities are more coordinated in processing and understanding certain architectural shapes and show a greater preference for curved forms and lines. Curved shapes are more relaxing and predictable for children with intellectual disabilities due to their soft and non-invasive structure. This type of shape prevents complex cognitive challenges, reduces anxiety and makes it easier for children to concentrate (Habbak & Khodeir, 2023, P. 4). In contrast, shapes with broken lines and sharp angles can be more complex for these children and create a sense of anxiety or stress. This correspondence between children's ability to understand shapes and their preference for curved lines is of great importance from an architectural design perspective. Especially when designing educational spaces for these children, the use of curved shapes and soft surfaces can help to improve spatial experience, reduce tension and increase feelings of safety (Sakya et al., 2017, p. 76). These results indicate that the design of educational spaces should emphasize simple and flowing forms. When designing walls, ceilings and even furniture, the use of curved forms rather than sharp angles can provide a more pleasing visual experience for children. In addition, these forms can soften spatial connections and improve the flow of movement in the room, which is particularly important for children with intellectual disabilities. Finally, these results show that the architectural design of educational spaces for children with intellectual disabilities should not only be functional, but also visually and sensorially adapted to their abilities and preferences. This interdisciplinary approach provides a platform to enhance the learning experience and cognitive, emotional and social development of these children.

As Figure 2 shows, when asked what material do you think the school walls should be made of*?* 54% of respondents ($M=24.94$, $SD=5.71$, $p<0.01$) chose a glass wall. This result shows the great interest of children with intellectual disabilities in transparency and openness of spaces. However, this does not mean that glass walls should be used in the architectural design of schools for these children. Rather, architects must use an appropriate combination of materials, considering the function of the different educational spaces, that both meet the psychological needs of the children and ensure the safety, efficiency and sustainability of the space. As discussed in the research theory, this group of children often suffers from symptoms such as anxiety, isolation and confusion. Such symptoms point to the need to create environments that promote a sense of calm and confidence in them. Materials such as glass and wood can play an effective role in designing educational spaces for these children due to their visual and sensory properties. By creating transparency and a visual connection to the outside environment, glass provides a sense of openness and reduces isolation, while wood, with its natural texture and warm colors, provides a sense of calm and security. In addition, the intelligent use of glass in educational spaces can not only strengthen children's connection with the natural environment, but also bring natural light into the room, which, according to scientific findings, has a positive effect on children's stress reduction and concentration. However, to ensure safety and prevent potential hazards, it is important to use durable and safe glass. The combination of glass with wood, furniture and decorative elements can also create a balance between transparency, decoration and practicality of the space. Therefore, materials with high sensory and visual quality should be used in the design of educational spaces for children with intellectual disabilities. These materials should not only fulfill functional and safety requirements, but also create a transparent, relaxing and inspiring space that helps to reduce anxiety and promote children's social interactions and learning.

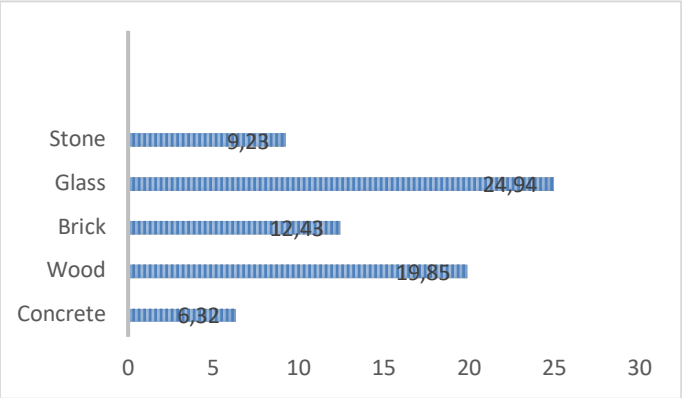

Figure 2. Frequency Distribution of Preferred Shapes (Author)

One of the most common symptoms in children with various forms of intellectual disabilities is a sensation of isolation and detachment from their surroundings, which is determined in part by the environment's spatial form and physical structure. Their reaction to soft, soothing, curving forms, whether in geometric shapes, and the relationship between the two, may provide an approximation to a desired design that suits their moods and environmental quality (Papoutsaki et al., 2013, p. 55). In another part of the study, the relationship between the symptoms and type of disability of children with intellectual disabilities and their preferences for the material of the school wall façade was investigated. For this purpose, the chi-square test ($\chi 2$) was used to determine whether the children's type of disability had an influence on their choice of wall material (such as glass, wood, concrete, etc.). The results of this test showed that there was no significant relationship between these two variables. This result means that the specific symptoms or type of intellectual disability do not have a direct influence on the children's preferences in their choice of wall material and that their choice may rather be determined by other factors such as visual experiences, sensory stimuli or even imitation of others. Psychologically, this result suggests that the material of the school wall as a specific environmental element may not be a decisive factor in the perception of and relationship to the environment for children with intellectual disabilities and that other environmental aspects such as shape, color, light and the overall architectural space may be more important. From an architectural perspective, this result emphasizes that the design of educational spaces for children with intellectual disabilities should not only focus on the type of materials but should consider broader and more effective factors such as the overall structure of the space, calming shapes, appropriate lighting and visual connection with the environment. However, the use of materials with positive sensory qualities, such as the transparency of glass or the natural warmth of wood, together with other factors, can help to create a more attractive and calming space. Finally, the lack of a significant correlation between disability type and wall material preferences emphasizes inclusive design, which means that educational environments should be designed to meet the needs of all children, regardless of disability type or severity, and to avoid discrimination or limitations in spatial experience. This method can foster a supportive and participatory atmosphere for all children.

Based on the data in Table 2, there is a significant correlation between the disability of the children and the choice of wall color, particularly green ($r=0.293$; $P<0.01$), blue ($r=0.251$; $P<0.01$), and orange ($r=0.211$; $P<0.01$), in the school. This result shows the importance of adapting architectural design to the mental and behavioral characteristics of children with intellectual disabilities. Appropriate design can help reduce behavioral problems and increase academic productivity. Children with intellectual disabilities and other exceptional groups require environments that not only meet their educational

needs but also create a calm and appropriate atmosphere by taking into account their specific symptoms and characteristics. Hyperactive children, for example, who often suffer from attention deficits and concentration problems, need an environment with stimulating and attractive colors (Kim et al., 2014, p. 127). From Read's (2019) point of view, this group of children needs an environment with varied and stimulating visual elements to attract attention and concentrate better. Colors such as orange or yellow, which are stimulating and warm, can be a good stimulus for these children. These colors stimulate curiosity and increase the desire to participate in educational activities. On the other hand, anxious or mentally disturbed children need an environment that gives them a sense of calm and stability. Soft colors such as blue and green can have a calming effect and reduce anxiety (Hotwani & Sharma, 2017, p. 44). This is very important from an environmental psychology perspective, as a suitable educational environment can have a direct impact on children's behavior and learning. Also from a sociological perspective, considering the different needs of these children when designing educational spaces is a comprehensive approach that helps to accept differences and strengthen their sense of value in society. Isolating these children from others may have detrimental social implications, but planning and designing with their unique qualities in mind is an inescapable requirement. In this way, color may be used not only as a decorative element, but also as a scientific and practical tool in the architecture of schools for exceptional children, helping to improve the quality of the teaching environment.

Table 2. Inferential Analysis of Color Preference (Author)

Shape	r	SD	Prob. Level
Yellow	0.123	3.61	0.000
Gray	0.092	2.25	0.001
Pink	0.101	3.02	0.000
Green	0.293	5.01	0.000
Red	0.104	3.40	0.001
Blue	0.251	4.88	0.001
White	0.138	3.64	0.000
Orange	0.211	4.37	0.000

4. Conclusion

The purpose of this study was to identify and evaluate the factors that determine the architectural quality of educational spaces for children with intellectual disabilities, as well as the impact of this quality on the reduction of behavioral disorders. This research focused on two main areas: architectural design and the psychology of exceptional children. Given the interdisciplinary approach of the study, the psychology of exceptional children was chosen as the suitable context for formulating the research hypothesis. The findings demonstrated the necessity of considering physical variables such as colors, materials, building shape, size, and proportions of spaces, as well as non-physical factors such as fostering a sense of calm, concentration, and independence in educational environments. Indeed, focusing on educational spaces for exceptional children is of particular importance because these children have serious challenges in focusing and improving memory. The longer they are In Inappropriate environments, the more mental and behavioral problems they will have, and the more complex and slower their learning process will become. It is therefore important to create suitable conditions in the educational environment so that these children can grow and progress.

One of the significant factors in this study was the issue of concentration, and the results of the study also underlined the importance of creating educational spaces. According to

the results, most of participants believe that private lessons help them to concentrate better. Accordingly, it seems that designing classrooms with smaller dimensions and a maximum capacity of ten people can create better conditions for learning and concentration. In addition, the use of soundproofing is necessary to prevent disturbing noises from entering these rooms to create a quiet and suitable environment for concentration. According to research results, colors can have a positive effect on the behavior and mental state of children with intellectual disabilities. For this reason, the choice of colors in the design of educational spaces for this group should be made carefully and based on the type of disability and associated symptoms to create an appropriate environment to improve behavior and learning. In addition, children with intellectual disabilities show different symptoms depending on the type of disability, including aggression, psychological problems, mental confusion, stress, anxiety and difficulties in interacting with the environment. Accordingly, the use of calming colors such as blue and soft colors such as white is recommended in the learning spaces of these children. The results of the study have also shown that more importance should

be given to the use of these two colors, as they have a positive effect on reducing anxiety and improving the calmness of these children. Another influential factor in the design of educational spaces for children with intellectual disabilities is the type of lines and shapes used in these spaces. The results show that these children are better able to understand and interact with curved and smooth shapes. This feature is of particular importance in the design of educational spaces in schools for exceptional children, as it can improve the quality of the environment and promote their performance and learning. There is also a significant correlation between the type of lines chosen, i.e. curved or broken, and the geometric shapes selected by disabled children. It is quite clear that they show a marked reaction to curved shapes. And this reaction is rooted in their symptoms of mental and emotional restlessness, lack of concentration, nervous disorders and disabilities. Another component of the architectural design of educational spaces for children with intellectual disabilities is therefore flowing and curved shapes and lines, which give them a desirable quality.

In general, it can be concluded that the architectural design of the educational environment plays a very important role in shaping the behavior, growth and development of children with intellectual disabilities. These environments serve not only as a space for learning, but also as a platform for promoting social interactions, strengthening self-confidence and shaping individual identity. From a psychological perspective, appropriately designed educational environments can increase children's sense of security, peace and belonging, which is particularly important for children with intellectual disabilities. These children are more prone to anxiety, frustration and social isolation due to their disabilities. An environment that responds to their psychological and emotional needs therefore helps to improve their mental health and increases their motivation to participate in educational activities. On the other hand, from a sociological perspective, the architecture of such environments can help to reduce discrimination and promote social justice. Educational spaces that are designed to be accessible, flexible and inclusive allow children with intellectual disabilities to interact with other groups and contribute to their social acceptance. These interactions play an important role in reducing social stigmatization and strengthening these children's sense of belonging. In addition, designing environments that encourage creativity, exploration and self-expression for children with intellectual disabilities can contribute greatly to their cognitive, behavioral and personal development. Colors, lighting, architectural forms and even the arrangement of furniture in such environments should be designed to stimulate children's senses and provide a multi-sensory experience. Such features encourage children to actively learn, strengthen communication skills and promote independence.

So, the architecture of educational environments for children with intellectual disabilities is not just a physical, but an interdisciplinary approach that can have a lasting impact on the quality of life and development opportunities of them by combining the principles of architecture, psychology and sociology.

Acknowledgement

I express my heartfelt gratitude to all of the participants who assisted me in carrying out this study.

Author Contribution

The entire study belongs to the author.

Conflict of Interest Statement

There is no financial or other substantive conflict of interest that could influence the results or interpretations of this work.

Research and Publication Ethics Statement

This study was conducted in accordance with research and publication ethics. The Concerned Research was carried out with the permission of the Konya Food and Agriculture University Scientific Research and Publication Ethics Board, decision numbered 2023/05-02 dated 04.09.2023.

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