Research Article

Via Design Focused Thinking Model, Surface Design Specific to Corridors Used By Children with Cerebral Palsy

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Abstract

The design that results from information processing is expressed through the use of numerous visual, verbal, or numerical parameters. Numerous methods, both traditional and contemporary, have been used in design education from the beginning to the present. Design thinking is a model used to represent the cognitive process through which design concepts are developed. Among the experiential learning methods is the design thinking model, which has become popular in recent years. The use of a design-focused thinking model in interior architecture education is reviewed in this study to see what kind of contributions it makes to the emergence of creative ideas. The study aims to increase the student's creative thinking development potential in the design process, reveal concept development skills, develop original design skills, and, as a result, make a cognitive contribution to design education. The study included a total of twelve students from the interior architecture department, divided into three groups. All of the students involved in the research visited the Selcuk University Medical Faculty Hospital Mehmet Emin Bakdemir Cerebral Palsy Treatment Centre, which was chosen as the sample area. After defining the problem, the design-focused thinking method was used to create the wall surfaces of the corridor connecting the physical and treatment rooms, which are used by children with cerebral palsy. The procedure is divided into five stages. By performing various readings on the final designs that emerged, the development of creativity in students was observed. As a result of this study, which was conducted using the design thinking model, it was determined that the concept quality of the projects made increased. As a result, in concept studies where creativity is addressed in design education, it is recommended that the process be managed through experiential methods such as the design thinking method.

INTRODUCTION

Social, cultural, economic, and technological changes from the past to the present have an impact on how people think and learn in society. With globalization, this effect also manifests itself in design education, which aims to teach how to create more identity and qualified design outputs (Onur, 2016). The long-established design discipline has occasionally interacted with other disciplines and derived many methods. Methods developed on the basis of the design discipline can sometimes serve as a model for other disciplines (Boyer and Mitgang, 1996).

Students are taught how to design or how to discover design methods through design education. In disciplines such as architecture, interior architecture, and landscape architecture, design approach methods, which are a necessity of design education, are frequently used. The education process that takes place in design education using traditionally accepted learning or teaching methods limits the individual's creativity because it is not open enough to different perspectives, preventing the emergence of original designs. The level of awareness of this issue has risen today as a result of changing dynamics. Designers are expected to produce unconventional designs that can compete on a global scale while giving aesthetics and functionality a top priority. Design creativity can be revealed through a process in which the individual discovers himself, pushes the limits, destroys familiar assumptions, is directed to mental designs with abstraction and analogies, and the memorization method is not used. With innovative design education models revealed through searches, the level of awareness on this issue is rising.

The most important aspect of design education is to mobilize creativity by focusing on how students can learn rather than how they learn (Dunn and Dunn, 1975). As a result, one of the most important issues in design education is how to develop the ability to think creatively. Many different methods have been developed in this context to reveal creative thinking by supporting it with different perspectives in environments where design education is given, which is considered the centre of design education. In 2004, a center called d.school was established to help students at Stanford University's Hasso Plattner Institute of Design see themselves more creatively and have a series of experiences that change their self-image. The design thinking model can also be used as a method in design education to help students focus on the problem and produce unique results.

The design thinking model can be used as a method in designing all spaces. As a field study, the corridor connecting the physical and treatment halls of cerebral palsy patients was determined as the sampling area in order to strengthen the disadvantaged groups and to enable the designing students to design by discovering people from different demographic structures. The sample area was examined in this study to define the problem, and the size of the space to be designed was determined by the interior architecture department students who

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participated in the research. The design-focused thinking method was then used to create a design specific to the function of the sample area. Various readings on the resulting wall surface designs revealed the development of students' creativity. It aims to investigate the opportunities and challenges of designing space based on the use of the original design requirements in the sample area and the design thinking method. Within the scope of the research method, it has been scrutinized what kind of contributions the use of the design-focused thinking model provides in the emergence of creative ideas in interior architecture education, and which is within the scope of the design discipline. The findings of this study are expected to contribute to the design education approach. Furthermore, it is intended to guide design educators and design candidates from a different perspective. Physical and therapeutic procedures have an important place in cerebral palsy, which is seen as a clinical picture that occurs between the early fetal period and the age of five and occurs as a result of brain damage. In the applied physical and treatment process, the physiotherapist's guidance and the motivation of the place in order for the patients to get more efficient results are reflected in the treatment process in a positive way.

Design Education and Creativity

Design can be defined as the process of learning, shaping, constructing, describing, or producing something in one's mind. The ability to solve complex relationships is required for design. As a result, regardless of the product's discipline, design is a long and alternating process with many parameters that must be repeated over and over (Evcil, 2014). Designers, on the other hand, are people who use their abilities such as "process, sensation, perception, thinking, and imagination" to bring the object they have created in their own world to the real level (Tunalı, 2004).

The main purpose of design education is to teach students how to design or how to discover their own design methods (Ulusoy, 1999). The design process, which includes the idea of "creativity," encompasses the processes of "thinking, producing new things, seeing objects or situations from different angles, and acquiring skills". (Beşgen, 2015). In many studies on design education, the importance of using different experiential methods to develop the concept of creativity in designing has been emphasized (Bacanlı et al., 2011; Charles and Runco, 2001 as cited in Kim et al., 2015; Ramm et al., 2013).

Despite being as old as human history, the idea of creativity has only recently become associated with the fine arts, particularly between the 15th and 19th centuries (San, 2004). At the beginning and later of psychology, the concept of creativity was an important research topic in philosophy. Throughout history, creativity has evolved into an interdisciplinary concept that has been attempted to develop in a variety of disciplines such as art, design, engineering, and medicine. According to Wallach and Kogan, creativity is "the ability to generate a large number of distinct associations while not completely abandoning the question"

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(Jersild, 1983). When we look at the studies on how to develop creativity in design education, we can see that different perspectives and studies on creativity make a difference in creativity theories.

Although creativity in design initially emerges as an idea in the brain, it can be developed and developed later on. As a result, in the educational environments where the design is created, a new formation emerges in which the student assumes responsibility and allows for the establishment of a link between newly acquired knowledge and skills, as opposed to previously acquired knowledge. This emerging formation has brought the student to the focal point and has made it possible to use many different design methods and methods frequently (Kesici, 2019). Aydınlı (2015) notes how important it is to reveal creativity in design education with different teaching methods, and Sayın (2007) mentions that evaluating this situation from a holistic perspective is related to experiential and incidental learning. Tucker and Abbasi (2015), who put forward a similar view, also mention that teamwork is beneficial in revealing multidimensional outcome products.

The understanding of creativity in the design process is in harmony with experiential learning methods. The experiential learning model is successfully used to explore how more effective learning can be realized in every field where design education is provided, to investigate the effects of differentiation in teaching methods and methods on creativity, and to promote the development of methods and skills to deal with problems encountered. When experiential learning methods are used correctly and effectively, it presents a very creative situation for students. It allows students to empathize with a subject, collaborate, and create experimental models during the pedagogical process. It fosters students' abilities to uncover a phenomenon through intuitive thinking and brainstorming, to take risks through collaboration, and, as a result, both inductive and deductive reasoning (Vanada, 2014). Learning the design by experiencing it in the social environment enables the transformation of the learned theoretical data into practice. This transformation harmonizes creative thinking with experiential education.

Design Focused Thinking Model

Design Focused Thinking, one of the experiential learning methods, is an integral tool that can help students develop their critical thinking skills (Razzouk and Shute, 2012). The concept of design thinking first appeared in 1987 and has frequently been chosen as a research topic (Ambrose and Harris, 2009; Brown, 2008; Owen, 2007). The design thinking method has gained popularity due to its suitability for interdisciplinary applications. (Dolata and Schwabe, 2016; Dorst, 2010; Koh et al., 2015; Liedtka, 2018). It has been determined that it is used with various approaches at every stage of education, from primary to graduate level, particularly in education, where the act of design is present. This method provides a result-oriented approach to problem-solving by providing creative solutions to current needs and expectations. In 2004, the Hasso Plattner

Institute of Design at Stanford University established d.school to help students see themselves more creatively and have a series of experiences that change their self-image. This centre has developed a design-focused thinking model that incorporates more traditional sciences such as business, law, medicine, social and human sciences into product design education (Brown, 2008; Pande and Bharathi, 2020). This method is known to be a way of thinking that can be applied in all institutions, from primary schools to the world's largest corporations. Design thinking is divided into five stages, according to this model. These are the stages of empathy: problem definition, idea generation, prototype development, and testing. These stages can be summarized as follows:

- Empathy: Understands their thoughts, feelings, physical and emotional needs in the context of the problem to be solved. This stage involves using a variety of empathy techniques, including 5N questions, relevant person interviews, and user interaction.
- Defining the problem: Focuses on the problem that is framed with clear and clear expressions to solve. Understands the larger social problems associated with a particular problem. In the definition stage, the issue is made crystal clear. People are placed at the centre of the problem definition, a large space is made available for creative thinking, and user empathy, experience, and affinity maps are created.
- Generating ideas: Generates multiple ideas or approaches to solving the problem and saves evaluations of ideas for later. Brainstorming and original solutions are developed during the idea stage.
- Developing prototypes: Creates a quick example of problem-solving ideas that build on each other. Before the design idea is put to the test with actual users, answers are sought regarding its feasibility.
- Testing: Gets feedback. Tests what doesn't work and explores how the prototype can be improved. This phase's goals are to identify what works and what doesn't, evaluate the outcomes, and make appropriate corrections. For this, the user is shown the prototype, feedback is sought regarding the suitability of the product or service being displayed by the user, and improvement areas are identified (Müezzinoğlu & Noraslı, 2022).

As a design-focused thinking model, d.school begins with identifying the problem and specifying the context. It then moves on to the empathy stage, in which the people (users) who designed something can be understood. Following the empathy stage, it moves on to the definition stage, where the situation is clarified and the focus is on the design, determining the meaningful challenge to be undertaken. To stimulate the emergence of new ideas, the group of designers must complete the idea generation phase, which includes brainstorming, sketching, or physically doing something that stimulates the emergence of new ideas. The phase

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that involves building something that will answer specific questions is then completed after it has been tested with the prototype phase. Finally, the design-focused design process is completed at the stage where user feedback on prototypes is collected (Cantwell, 2019; Design Council, 2021; The Interaction Design Foundation [IDF], 2020).

Because of the parallel relationship between design thinking and creativity, it is clear from the literature review that many countries have incorporated this thinking method into their educational curricula. It has been observed that a curriculum that integrates design-focused thinking processes with academic and professional fields and reveals the individual's skills in education increases creativity in the design process (Goldman, 2002; Education Commission, 2002; Heskett, 2003; Pande and Bharathi, 2020). Using the design-focused thinking method to address a social problem such as creativity is essential for reviewing academic studies in the field and guiding future research. The following are the findings of some studies on the effect of design thinking on creativity.

Students who are encouraged to use the design thinking method are seen to be more open to the process, have clearer learning outcomes, and complete the design process more quickly (Assaf, 2009). Wrigley and Straker (2017) looked into how design thinking methodology affected how well undergraduate students learned in 51 different courses offered at 28 universities. An "Educational Design Ladder" with levels for products, projects, businesses, and professionals has been developed in the study. The study's findings have shown that design thinking is a crucial technique for identifying differences in methodology. The research by Luka used a similar methodology (2014). The study's findings highlighted the importance of the human-centred approach as a key differentiator in the final product when approaching problems through design-focused thinking. According to Moirano et al. (2019), there exists a growing trend for creative cross-disciplinary collaboration using the design-focused thinking method. On the other hand, Lindberg et al. (2010) looked into how the design thinking approach can enhance cross-disciplinary collaboration. The study has highlighted how the process of experiential learning with design-focused thinking makes it simpler for the designer to discover himself. Most studies claim that people possess the skills needed for design, but when the design thinking method is actively applied, people can develop the skills needed to solve problems that call for creativity and have an impact. The application of the design thinking methodology is growing daily, and it is becoming clear that it is a crucial tool for the training of designers for the twenty-first century. When combined with the appropriate techniques, the design-focused thinking approach equips designers with the skills necessary to successfully address the ever-evolving challenges that the global society will encounter in the future (Cantwell, 2019; Koh et al., 2015; Teixeira, 2010).

Spatial Perception in Children with Cerebral Palsy

First off, the space, which includes the constricting locations made by nature, has been used by being specially designed over time in accordance with user requirements. As a result, space has always been crucial to the continuation of life. Restricted areas where people can feel safe are always needed (Proshansky et al., 1983). Space is described as the space that controls how people live, the space that somewhat isolates people from their surroundings and permits them to carry on with their activities (Hasol, 1993). Man first displays his behaviour by recognizing his surroundings. To the extent that it can perceive the space, this behaviour becomes more efficient.

The perception of the space can be used to explain the characteristics of spaces that are designed to meet the needs of the user. Humans experience and interpret space using their senses, and they feel and understand things by connecting them. Perception is a component of numerous cognitive processes, including reasoning, imagining, and associating, and it varies depending on the individual's cognitive make-up (Goldstein, 2010; Hart and Moore, 1973). By providing a stimulus to the senses, the environment can influence how perception is formed directly or indirectly. In addition to the stimulus, perception also responds to differences in the environment and an individual's current circumstances (Cutting, 1989). As a result, the personal characteristics of the individual, such as culture, age, and health issues, as well as the environmental characteristics of the space, influence how the space is perceived.

The interaction between human and the environment is a result of how individual experiences the world through their senses. This interaction is best described by Pallasmaa (2018) as follows: "While the space reflects its distinctive features, the person who experiences it also transfers his/her own feelings and perceptions to the space, that is, the user interacts with the space." It is an information-gathering procedure in which spatial perception, environmental stimulus, and spatial experiences are all combined and understood in light of how the user interacts with the environment. It can be exhibited throughout the entire warning, sensation, perception, and informatics process. The environment's stimulant effects are first detected by perception, after which they become information and are retained in long-term memory. Although the senses are used to perceive space, the organ of vision takes on the most significant role. Therefore, visual stimuli are the first physical stimuli to emerge in the perception of space (Güller, 2014).

Health structures should be made perceptibly because they are very comprehensive. Hospitals are large, multifaceted structures that serve many different user groups, including patients, visitors, and medical professionals. Children's hospitals, on the other hand, are defined as healthcare facilities where children between the ages of 0 and 18 are recognized, diagnosed, treated, and recovered from. It is possible to see that children's hospitals can be divided into two categories when

examples from around the globe are considered: hospitals with all medical departments and hospitals focused on a particular medical branch (Arık, 2019).

These structures are broken up into a great number of tiny cellular spaces. Such spaces or circulation areas that offer inter-space relations are challenging for users to experience, perceive, and move through (Allison, 2007; Güç et al, 2013). The design of children's hospitals should take into account not only the needs of young patients (0–18 years old) but also those of their companions. It is also important to keep the needs of young patients apart from those of adult patients in the medical field, which is undergoing continuous development and change (Dikmen, 2012).

Hospital settings can be frightening, especially for young patients. As a result, hospitals are occasionally thought to be stressful for kids. Fear and anxiety brought on by poor hospital environment design can also result in behavioural disorders (Nasab et al., 2020). As a result, when designing the space, it is important to keep in mind that the user group includes children between the ages of 0 and 15, whose aesthetic, physical, and psychological preferences will change over time.

On the other hand, designs can be created for perception detections brought on by diseases for kids with various illnesses. Interviews were conducted with patients, their families, and nurses to learn more about the colors and patterns they would like to see in the Sheffield Children's Hospital waiting area. In the waiting area, colors that wouldn't frighten children with autism were used after taking into account the likelihood that they would be among the hospital's patient (Arık, 2019). In areas where children with specific and chronic diseases are continuously treated, this circumstance occurs more frequently.

A known progressive or degenerative brain disorder that develops as a result of central nervous system lesions, damage, or dysfunction in the early years of life is known as cerebral palsy, which is a specific disease. Accordingly, cerebral palsy is thought to be a non-progressive permanent loss of motor function that affects movement, posture, and movement disorders. It results from damage to the developing brain during the fetal or infantile period (Öneş et al., 2008). Depending on how much of an impact cerebral palsy has had on the mind, different people may perceive space differently. According to the definitions of cerebral palsy, because of the disease's conscious subjective state, how a patient is treated will depend on how they perceive it. spaces with individualized design elements that encourage children with mental or physical disabilities to live their lives by allowing them to spend time learning and having fun like other kids without feeling pressured or excluded from society (Uslu and Shakorui, 2012). The therapeutic quality of quality spaces becomes apparent when taking into account the psychological state of children with cerebral palsy in the setting where they are treated.

The factors that directly affect the legibility of health buildings are the quality of the corridor design and the user's characteristics (Ünlü et al.,

2008). Walking through long corridors to get somewhere can be tiresome. Users feel anxious because they can't see the end of the corridor or are unsure of where to exit while driving (Kazanasmaz, 2004). As a result, it is crucial to design the spaces where children are treated as well as the passageways that properly and visibly link the spaces together.

While traffic on roads is described as the fluidity of water, circulation is the movement of people inside a structure. On the other hand, the circulation area is the space occupied by building features like ramps, stairs, and corridors that connect different volumes (Hasol, 1993). The quality and originality of the designs used in the circulation areas greatly influence how the space is perceived. The unique designs that were created for the corridors in this setting strengthen the feeling of community and give the area an identity. Circulation areas that link the spaces can be both physically present and conceptually represented by a volume or surface value (Canbakal Ataoğlu, 2009).

Due to their vertical orientation, wall surfaces are the most visually effective surfaces for defining space (Ching, 2002). Wall surfaces are therefore superior to other surfaces in terms of enhancing interior perception. By sending certain visual messages to the users of the space, designers give the environment a certain personality. As a result, the associations made by the environmental stimuli influence how the user perceives, thinks, and behaves concerning the environment. The majority of the messages to be delivered are loaded on the interior's vertical surfaces (Aydıntan, 2016). Numerous factors that contribute to the space's construction also have an impact on how the space is visually perceived by the individual. The space is made up of design components in this work of fiction (Yılmaz, 2004). In interior design, surface designs contribute to the formation and organization of space by utilizing elements like color, texture, material, and light. Over time, this formation solidifies and gives the location a name (Okuyucu and Çoban, 2019). Functional, physical, and aesthetic expectations for the space are very high, especially in locations that offer treatment services for particular diseases. The designed spaces are unique and qualified because the designers accurately translated these expectations into the spaces.

METHOD OF THE STUDY

In the context of the Health Buildings course that they took in the fall semester of 2022–2023, this study was conducted with the senior students of Selçuk University's Faculty of Architecture and Design, Department of Interior Architecture. Design-focused thinking methodology was employed in the study methodology to emphasize creativity in the created designs. The first-floor corridor of the Mehmet Emin Bakdemir Cerebral Palsy Treatment Centre at Selcuk University Medical Faculty Hospital was chosen as the sample area for this study. The corridor between the physical and treatment rooms is 147 m2, as

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shown in **Figure 1**. The building is 280 cm tall. As a result, the space has two 273 m2 wall surfaces on the right and left.
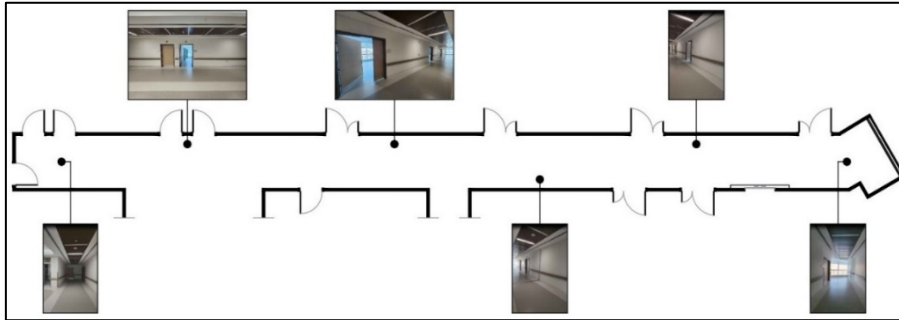
Over the study's sample area, three different surface designs were displayed. The projects were carried out in groups of four, with a total of twelve students. Every stage of the design thinking model used in the study's methodology aims to establish a process environment that will safeguard the quality of the work to produce a successful outcome by illuminating the subsequent stage. The five stages of "empathizing, defining, generating ideas, developing prototypes, and testing," which are the chakras of the design-focused thinking method, were used to create the designs realized within the parameters of the stated purpose and method, as shown in **Table 1**.

Table 1. The process of studying according to the design thinking model.

Stages	What's been done
Empathy	Explaining and examining the subject and process.
To identify	Creating the word cloud for users in the venue.
To generate ideas	Writing design scenario with word cloud constraint.
Developing a Prototype	Designing wall surfaces within the scope of the scenario.
To test	Analysing the designs made at the level of originality.

The students who first examined the sample area were given the opportunity to draw conclusions and develop an understanding of the users within the framework of the method developed in accordance with the design thinking model. The corridors connecting the spaces are intended to be experienced while waiting in the areas where children with cerebral palsy are treated to determine what is needed visually in the surface design in this situation. According to the study's methodology, it served as a guide for defining the issue in the second stage after establishing empathy in the first. Limitations were set with the word cloud in the second stage, and the project was deepened with the next stage's writing of the design scenario. As a result, textual guidance was provided before visualization for the word cloud, design scenarios, and prototype designs produced by the groups in the second and third stages. A prototype was created by designing the corridor where children with cerebral palsy wait while receiving treatment after thoroughly analysing

all of the data. As a result, the lecturer conducted a descriptive analysis of the designs created in the fourth stage in the final stage.

CONCLUSION AND EVALUATIONS

The stages of empathy, definition, idea generation, prototype development, and testing were used to analyse and evaluate the results obtained using the study's methodology. These stages were discussed in accordance with the design thinking method.

• Stage One: Establishing Empathy

To empathize in the setting where the study would be conducted, information about the subject was provided and investigations were made in the first stage of the study. Measurements of the area and the existing corridor were determined. Following the one-to-one experience of the sample area, all group members discussed the results based on the observations and communications made collectively. The treatment procedures for children with cerebral palsy and their roles and expectations in the environments they use served as a means of fostering empathy in this situation. The group members' ability to empathize ensured that the study's targeted limitation was clearly defined. By taking into account the demographics of the users of the space and adopting their cognitive and behavioural abilities, the design students who initiated the design process used the space similarly to them.

As a result of observations and empathy, knowledge about what cerebral palsy children enjoy, how to motivate them, and how they unwind provided the problem's concretization before it was defined. Accordingly, it has been discovered that physicists and therapists with dreams of flying in the sky, running in nature, or swimming in the sea motivate children with cerebral palsy while they are receiving physical therapy. Children with mild cerebral palsy enjoy painting and reading stories, and many of them are fairy tale heroes, according to research. Additionally, it has been found that kids with cerebral palsy enjoy chatting and playing to socialize.

• Second Stage: Identify

In the definition phase, which follows the problem's identification and assimilation, the goal is to describe the situation more clearly and simply. When children with cerebral palsy were being treated in the early stages, activities like walking in nature, flying through the air, swimming in the sea, loving animals, and going for a stroll with fairy tale characters were generally excluded from the registry and used to refer to definitions. As a result, the notes taken while experiencing the space in the first stage were condensed, replaced with words that placed more emphasis on them and guided during the definition stage.

Student teams identified keywords to represent the images created following the information obtained and reflect them on the design by giving them more authority. As shown in **Figure 2**, the extracted keywords were discussed, gathered into a single pool, and expressed

using the word cloud technique. In a meeting that included all of the group members, the keywords that each group had independently proposed were combined. Following that, similar-sounding words were combined, made simpler, and gathered on a single platform. With the definition phase occurring before the idea generation phase by choosing the words determined for the subject of the project, the images formed by the verbal concepts started to settle in the mind within this platform, which we define as the word cloud. As a result, the information that will determine the projects' concepts was gathered, and the information obtained for the design was defined. The words created for the examined space, the users, and the targeted design images have been simplified and given a concrete form to generate the idea for the study's topic. It has been found that defining the issue in terms of potential solutions gives designers crucial convenience when coming up with a design concept.

Figure 2. Word cloud created by students.

• Stage Three: Generating Ideas

After the phases of definition and empathy, the collected data were assessed, and the idea generation phase was launched by creating a design scenario. At this point, all actions taken to generate ideas were completed. The designer is guided and assisted in the process by using a scenario—either one that already exists or one that is created—to generate ideas and lay the groundwork for visual design. The concepts in the word cloud, which were derived during the definition phase, served as a guide for the creation of the design scenarios in the idea generation phase. For the written design scenario, each group separately chose a keyword from the word cloud and then created a design scenario based on these words. At this point, the groups were divided and a foundation for the design of three distinct projects was created. As can be seen in **Table 2**, the introductions to the design scenarios were thus created using the keywords that were found in the word clouds of three different groups. Accordingly, the keywords from the word cloud of three different groups were determined by the coordinator and the students participating in the study with their closest connotations and they created the introductions of the design scenarios.

Table 2. Development of the design scenario.

Groups	Keywords	Introduction of the design scenario
1st Group	Story, Travel, Tale Hero.	A fairy tale hero's adventures on various journeys make up the scenario. Wall surfaces are therefore decorated with various images, including those of space, a camp, a farm and rain. By linking the surface of each depicted wall with the specified QR code and including a personal photo in the system, it offers the chance to experience the adventures with the hero in a virtual setting.
2nd Group	Water, Seas, Season.	The design scenario was created based on the therapeutic power of water. As a result, the design of the wall surface featured fish, underwater images, and the calming qualities of the beach. By using the projection mapping technique to reflect the seasonal changes in the virtual environment, the flow of life is further explained.
3rd Group	Nature, Animal, Play.	The study's central themes are nature and the animal kingdom. It shows a variety of wild animals swimming, flying, and running. Additionally, themes were developed while people were waiting in the hallway to teach children with mild cerebral palsy how to count, learn colours, and categorize surfaces according to dimensions.

• Stage Four: Developing a Prototype

The wall surface design and prototype were created by converting the concepts generated by design scenarios into images on the surfaces. It can be seen that the wall surface designs serve as the foundation for the design scenarios where the dynamics of the keywords are created. Accordingly, the various locations where the study team's imagined fairy tale hero went on a stroll were visualized and described with a surface design in the form of a story in the wall surface design that the first group created by taking into account the concepts of story, travel, and fairy tale hero. Based on the healing properties of water, the second group created surface designs using the ideas of water, sea, and seasons. These designs included images of the ocean floor, the coast, and seasonal changes. The ability of living things to swim, run, and fly was referenced in the wall surface design that the third group created by taking into account the concepts of nature, animals, and games to visually express the images that such movements will provide motivation during the treatment process. As shown in **Table 3**, wall surface designs are expressed as appearances in the digital environment. It is clear that the information that provides the motivation of children with cerebral palsy is taken into account at the stage where designs are made for the problem and the solution is addressed with prototype development. In this direction, wall surface designs based on ideas like fairy tales, games, nature, and water were carried out at the prototype development stage. These ideas were revealed as a result of observations made while the children were being treated and waited on.

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Table 3. Wall surface designs prototyped by students.

1st Group	
2nd	
3rd Group	

The wall surfaces, the prototypes of which were developed, were designed by drawing in accordance with the original of the space. An application-focused prototype has been created, taking into account components like wallpaper or interior wall paint. While the first group's prototype depicts the locations visited by the story's protagonist on the right and left wall surfaces, the second group arranges the healing properties of water by showing an underwater scene. In the third group, nature and animal images were used to create the prototype that was developed with interrogative and instructive texts.

- Stage Five: To Test

The instructor used the design-focused thinking method to complete the testing phase, which is the last step in designing the wall surfaces of the corridors that connect the physical therapy treatment rooms for children with cerebral palsy. The designs based on interior architecture were assumed to be made in accordance with the established methodology during the testing phase. In this situation, the project group prototypes were accepted as the final product, and the entire process was evaluated following the method's stages. The following are the evaluation criteria that were taken into account:

- At the stage of establishing empathy, the acquisition of existing data and the development of detecting the problem,
- In the identification stage, the data can be made concrete by revealing,
- Establishing a connection with the design by analysing the data during the idea generation stage,
- General evaluation of the technical accuracy, conceptual compatibility and design quality of the result that emerged during the prototype development stage.

The first group uses a story based on a fairy tale hero to represent the places they visit on the wall; the second group arrived at a design solution by using the healing qualities of water and depicting undersea and seasonal changes; the third group, on the other hand, used the prototype development by using a love of nature and animals to demonstrate that

the steps work. Because of this, the three groups' design stages involved empathic perception and definition of the problem, simplification of definitional concepts, writing of limiting descriptions, the establishment of a quality connection between the text and the visual design, original and qualified action, and creation of a prototype.

The designs are more readily embodied by developing empathy through on-site observation and data analysis, it has been observed based on the overall assessment made taking into account the aforementioned criteria. The process of creating a word cloud from the keywords that the groups generated increased the speed and improved the quality of the designs that were created on the wall surfaces. In general, it has been noted that original designs are taken into account, some data will boost cerebral palsy patients' motivation during treatment, and designs are made by taking into account the furnishings in the space.

The goal of design is to solve a problem. The person or people who are experts in their field and have received design training are the ones who can solve this problem. The process of designing the problem and then arriving at a solution entail going through several stages. One of the biggest challenges in the design process is conceptualizing the design and accurately transferring it into a prototype. In light of this issue, conventional approaches to design education fall short. Such issues harm the quality of the finished products and the concretization of concept ideas. In design education, unrestricted individual or group projects tend to resemble one another by straying from originality. As a result, the prototypes that appear during the design education process without being based on a methodology deviate from quality. Additionally, it might make a design student who places more emphasis on the result less motivated. It is advantageous to manage the process using techniques that have been scientifically validated so that the created designs can be realized without any issues per the targeted purposes. The methodology of design thinking is the one used in design education that contributes to the process the most.

Five stages make up this study, which was conducted using the design-focused thinking methodology. Making observations by looking over the sample area on the spot helped define and assimilate the problem in the initial stage of empathy, boosted project ownership, and created an inspiring environment for concept ideas. In the second stage, the designs could become more enriched and multidimensional thanks to the definition, analysis, and open discussion of the data among all project groups as well as the combining of the emerging concepts into a single word cloud. As a result, the design scenario developed for the concepts selected from the word cloud during idea generation, the third stage, has served as a very explanatory manual for the project's design. The final products were created and finished in accordance with the determined subject's original value during the fourth stage, prototype development. In the final testing stage, it was determined whether the projects created within the given constraints create a qualified design sample.

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These findings largely accord with those of the studies conducted by Goldman (2002), Heskett (2003), Luka (2014), Pande and Bharathi (2020). By using the design-focused thinking methodology to create the wall surfaces of the corridors connecting the physical and treatment rooms for children with cerebral palsy, the capacity to reveal original and creative ideas in design education has been developed. As a result of the data obtained from the study, in the design made with the design-focused thinking method; it is seen that it is possible to obtain, process and transform the data into the final product, facilitating the design process. The quality of the projects completed in relation to the concept has improved as a result of this study conducted using the design-focused thinking model (d.school). In light of this, it is advised to manage the process using experiential techniques like the design-focused thinking method in concept studies where originality and creativity are discussed in design education.

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