

Interaction product design requirement for Children with disorder (Attention deficit hyper activity Disorder)

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Abstract

The category of children affected with ADHD has become not small, in local and international level, and rapidly increasing.

Behavioral therapy is one of the most important treatment methods that help to rehabilitate behind medical therapy ,

so it was necessary to appear the role of industrial design and how it can contribute to support This category by designing products with special considerations that support them, reduce disease symptoms and participate in recovery.

interaction is one of the most important features to be considered in product design, which is meant by the nature of the mutual dialogue between the product and the Child ,

and the more this interaction is being interesting and interactive. The more the user is connected and affected with the product, while it is boring, then the user will lose his passion for the product and look for another product..

And since the interactive characteristic in the Industrial design product one of the most important characteristics that affect the child when using the product,

Therefore, the research talk about the role of it in designing products specifically for children with ADHD, and how interactive design participates with all its elements in improving the child's condition, enhancing his behavior, and focus his attention for longer periods, and reducing the hyperactivity.

This is in order to demonstrate the importance of interactive design in positive participation in designing products for this category to participate in their rehabilitation and to reduce symptoms, risks and negative effects of the disorder on them.

Keywords:

ADHD, interaction, product design

1-Introduction

Interaction is one of the most important things that must be taken into account in the design of the product, and what is meant is the interaction of the product with the person who owns it or uses it.

Also, children with ADHD number is not few locally and internationally, and behavioral therapy along with drug therapy have become important in their recovery.

The research reveals the role of interactive product design which is being designed for this group of children, and designing products that contribute to improving children's behavior and aid in their recovery through their use of these products.

2 - Problem of the study

The percentage of children affected by ADHD has become insignificant and is increasing continuously, which reveals the necessary role of the industrial designer in contributing to support the cases of these children through his ability to design products in all aspects of daily life characterized by special considerations and interactive criteria, which support their disease cases and control their behavioral disorder and direct their behavior and secure them against symptoms of the disorder.

3 – Objective of the study

Set interactive design considerations to design special products for children with ADHD that contribute to improving their health status, support their attention and reduce disease symptoms.

4 - Significance of the study

Establish interactive design considerations for products designed for children with ADHD that would obtain a suitable product for this category of children, taking into account their behavior and the nature of their use to obtain a product that may contribute to their rehabilitation.

5 - Statistics of the prevalence rates of ADHD, globally and locally

(ADHD) affects people of all ages, and worldwide it is estimated to be about 2.2% in children and adolescents (under the age of 18). It was found that boys are more likely to have ADHD than girls (12.9% compared to 5.6%).

In Egypt, its prevalence among primary school children ranged between 6.5% and 7.9% (5-8) years.

6 - Levels of ADHD

The term ADHD is a combination of two terms - Attention Deficit Disorder (ADD) associated with Hyperactivity Disorder (HD).

Groups of children who suffer from the different types of disorder differ on the following levels:

- **The combined type:** It has symptoms of hyperactivity, lack of attention and impulsivity to the same degree (ADHD). This type is one of the most common types among children.
- **The type** that is predominantly hyperactive or impulsive and in which hyperactivity or impulsivity appears more prominently than lack of attention (HD).
- **The type** predominantly reduced or distracted: Attention deficit dominates hyperactivity and impulsivity (ADD).

7 - Symptoms of a (ADHD) disorder

7-1- Symptoms of Attention Deficit Disorder (ADD)

Difficulty maintaining attention for periods that require more effort than automatic attention, superficial perception of information, which causes difficulty in remembering and forgetting a lot, difficulty in organizing information and in distinguishing between what is related and not related to the topic of conversation, difficulty stimulating more than one stimulus together, difficulty alerting to the stimulus which appears or occurs slowly.

7-2- Symptoms of hyperactivity and impulsivity (HD)

Fidgeting nervously with excessive activity in the hands and feet, evasiveness and confusion in the seats and leaving seats suddenly, preference for activities that stimulate movement, inability to delay reaction, inability to be patient or wait, to run, climb and talk a lot, inability to remain still or play quietly.

8 - Elements of interactive design and their relationship to ADHD children

There is a set of interactive design elements in the product (sound - space - time - aesthetics - movement), which add to it the character of interactivity and will increase the success of the user's experience in dealing with the product and leave the user with a positive or negative experience towards the product that continues with him/her during his/her acquisition of an unparalleled one. There are also many factors that affect the attention in the external environment, which are used with the interactive design elements in the design of the product, and they are what concerns the alarm for the element that is used, whether sound, time or movement These factors are considered (alarm intensity - alarm volume - Alarm change - Alarm movement - Alarm clock or recency - Alarm position - Alarm clock nature - Contrast - Alarm display again). A child's normal attention span ranges between 3-5 minutes for each year of life, and varies with different ages.

8-1- Motion: The movement of the product facing the child can control his attention and his ability to maintain his focus. Therefore, the types of product movement.

- Self-movement of the product:

It is a product that interacts with the user through his own movement, either using electric charging or batteries.

- Interactive motion in product function:

That is, the main function of the product is to sense the reciprocal interactive movement between the product and the affected child, and it is the best for the child with the disorder, because this would withdraw the excessive movement energy that afflicts this category of children and convert it into mental and mental performance, focus his attention and perform it correctly in order to achieve the correct result of use.



8-2- Space: It is the free space surrounding the product - in which the product will be used, and the study of the space or the area surrounding the product is closely related to its success in performing its function and helping the user to obtain the desired goal of the product, for

example, the surrounding space greatly affects the mind of the affected child as he/she suffers many symptoms that enter the nature of the inner space as part of it, such as; Is the vacuum quiet or noisy? Crowded or simple? Is it a wide or narrow space? Does it contain an external stimulus that affects the child during use or not? All of these factors necessarily affect the affected child's use of the product.

8-3- Time : Some product tasks and functions are completed in a very short time, such as the time it takes to click a button, and others require very long periods, and there are complex tasks that require varying times to complete them, and the user may become frustrated and angry during use, which leaves a bad use experience for the product for him, time creates the rhythm of use, and we find that a child with ADHD has many symptoms that are directly related to time, so the job should not require more than one step or steps resulting from each other due to his inability to maintain his attention for long periods, so the job must be direct in a short period of time, and related to a movement activity or stimulus.

8-4- Sound

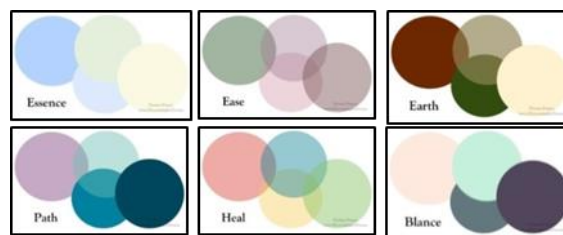
Sound is a very small part of interactive design, but it has sometimes proven to be an important element in product design. Sound consists of 3 basic components: pitch - volume - quality, and sound must serve the function, and research indicates that music strengthens the areas of the brain that are weak in children with ADHD.

Therefore, classical music has been recommended especially for children, which contribute to the treatment of children with hyperactivity and attention deficit, which can be integrated into the function of the product to help maintain the stability of the child for longer periods and control his hyperactivity.

8-5- Aesthetics: Aesthetics are one of the most important factors on which a product depends on its success and its achievement of a successful use experience.

Shape / Form - The product is often defined as its shape, some product designs are regular with sharp edges, and others use organic curves and lines.

Color: It is recommended to stay away from hot and direct colors and a tendency to calm colors, and there are some colors recommended for use in designing products for children affected by the disorder.



Texture

It has a role in the direct perception of the product, as it has a relationship to express the nature of the product's raw material, which would participate in the safety and interaction factor of the child, and there are materials that have the ability to absorb shocks such as rubber, so it is always preferable to use them because of their ability to absorb stress, anxiety, and hyperactivity in these children, and it is very much preferred to stay away from materials and rough or sharp, metal or wooden sides.

Fashion and Familiarity

The style is necessary because the products develop quickly, and each timing carries a different style from the above.

As for harmony, it is necessary because one of the most important symptoms of the affected child is the distraction of attention and finding it difficult to quickly perceive the new and deal with it, so the simpler the shape of the product with ease in expressing its function and nature, the faster the child's awareness of the product and it will be able to achieve its goal easily.

Proportion - Symmetric - Balance

Commitment to proportionality in the product, there is no large part at the expense of small parts, or large areas in the product that take a more powerful color than other parts of the product because this would distract the child from the function and the main goal of the product and be preoccupied with that, and there is no objection to the presence of symmetry in the design if it does not affect the function of the product or does not weaken the other features of the aesthetics of the product, because it contributes to the speed of perception, attention and interaction towards the product.

Research results

Due to the importance of the interactive aspect in product design and its significant impact on directing performance and controlling behavior and what affects the user's perception and attention, so the requirement for interaction design is:

- Interactive considerations for MOTION

Avoid self-propelled or stand-alone products. -

- Recommendation of products with reactive movement, in which the movement of the product is a reaction to the movement of the child.

-- Paying attention to the following elements when using the alarm element in the interactive design - respectively of the most important - (movement of the alarm - intensity of the alarm - changing the alarm - the position of the alarm - the nature of the alarm - remodeling the alarm - the size of the alarm - the contrast of the alarm) in order to properly control interactive alarm in the product and achieving its goal, whether it is audio or visual.

- It is preferable to add effects that absorb tension and movement in the product as a kind of additive effect or secondary function.

The product helps to control performance and stimulate interaction with the child -

- Renewal directing the child's focus and attention towards the product continuously and repeatedly to maintain his attention and focus.

- The style of use, the job, or the interactive effects stimulate waiting and staying for periods.

-- The method of use is safe and the use area is safe and the product does not expose the child during its use to any risks.

- The product, by its function and usage method, stimulates the reduction of random movement and hyperactivity.

- Interactive considerations for SPACE

Considering space as an integral part of studying product design and developing ideas- **Study the relationship** between the product and the surrounding space when it is fixed or used and

performing its function and what is the interrelation between the product and the surrounding space in both cases - **Taking care** that the space surrounding the child in general (calm - simple - spacious - does not contain any physical obstacles) as much as possible or any external damage , not designing a moving product in a narrow space - **The space** surrounding the product is safe from hazards during all its conditions, whether storage, disassembly, installation or use. **Some products** may need more areas than normal to take into account hyperactivity and constant movement of the child.

- Interactive considerations for TIME

- Adjusting the time element in the interactive product design in a way that avoids boredom / stimulates the child to fully realize the information.
- The product's function is direct and with the fewest number of steps and the least possible timing for each step.
- If the designer is forced to have time to obtain the desired function of the product, it must be supported by an audio or visual interactive effect that renews the child's attention to remain still until the product is used.
- It is preferable that the period of preparing and using the product and obtaining the desired function does not exceed 3 minutes.
- The product enhances the time component by performing tasks at a specific and fixed time.

- Interactive considerations for SOUND

- **The volume** of the sound is proportional to the size of the space in which the product is located so that the degree of sound is clear, appropriate, audible, and appropriate for the child, - also the volume (thin / huge) is proportional to the function and nature of the product and the age of the child.
- One of the most important factors of sound quality (its clarity / lack of interruption / lack of interference / clarity of the exits of words, letters and words) in order to maintain the child's attention for as long as possible and to avoid getting upset about the lack of clarity of the voice or interference in sounds.
- Changing the pitch, hue and nature of the sound would renew the child's attention and add excitement and fun to the product.
- Failure to stimulate more than one sound stimulus at the same time because the child is unable to absorb.
- Study the speed of sound that is being appropriate for the job because the affected child does not tolerate the sound stimulus that appears or occurs slowly.
- It is better to convert text clips written on the product or control panels into audios that will increase the pleasure of interaction and ease of understanding.
- Using music intended for children with disorder as a background for the product's audio.
- Using sound in warning and providing safety from errors of use to reduce them and protect the child.

- Interactive considerations for Aesthetics

- **The shape** (the design of the product must be of a simple, uncomplicated and balanced shape
- it does not contain multiple parts or separate pieces or any additional details that are not

intended - the shape must be clear, understandable, direct and expresses its function - it should not contain control panels many or complex - the design should encourage interactivity and use - it is preferable to use blunt lines and keep away from sharp edges - it is preferable to use organic lines that encourage rest, and relaxation.

- **Color** (it is preferable not to use hot, exciting or direct colors - the color must express the significance of the product - it is preferable to use the color groups recommended for children with ADHD and referred to in the research).

- **Texture** (it is preferable to use different touches and must have safe materials to stimulate the child's attention - it is preferable to use flexible materials that absorb shocks - the tendency to use natural materials is preferred - it is preferred to stay away from metal or sharp materials with all their derivatives in the design for this category of children).

- **Style and composition** (the product must be appropriate to the style, fashion and the latest design methods - the shape of the product must be familiar and not strange so that the child quickly gets acquainted with it - the model design must help to quickly understand the nature of the product and the method of its use and dealing with it).

- **Equilibrium** (interest in balance in product design so as not to cause confusion, perception or a feeling of anxiety and lack of understanding for the affected child - Paying attention to the element of proportion and ratio in the product details to facilitate the perception process - The presence of some symmetry in the product that helps to quickly understand and respond to it by the affected child, without exaggerating it, but taking into account (not to affect the function of the product or weaken its other aesthetic features) - The design of the product must not be exaggerated in its length, breadth or sense of weight.

References

A- Periodicals :

(3) AbdulRahman, Julia: **Review an alternative seating for Attention Deficit Hyperactivity Disorder (ADHD) Children**, International Journal For Study on Children, Vol3, January, 2018

(4) Amer, Laila, Alqahtani : **Space design for Hyperactivity and distracted attention (Methodology of Sustainable Material Use)** , Princess Noura Bent Abdel-Rahman University , Postal 12345, Riyadh, Saudi Arabia,2014

(5) Amer, Laila, Alqahtani : **Furnishing and Indoor Environment for Hyperactivity and Distracted Attention (in the Context of Sustainable Design)** , Princess Noura Bent Abdel-Rahman University , Postal 12345, Riyadh, Saudi Arabia,2015

(6) **Sadaat, Mohammed Fattoh Mohammed. Edtrab Naks Al-Entbah L-Mashob Be-Fart Al-Nashat (Sobat Al-Taalom Al-Namaeya)**, Al-Kahera .

B-Books :

(7) Laura Rodríguez Santos : Design of a toy which helps children who suffer ADHD to develop their skills , **MASTER THESIS** , INDUSTRIAL ENGINEERING , Univerza v Mariboru .5