Creating Design Solutions to increase the Usable Time of Children's Clothes by Using Automated Embroidery Technology

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Abstract

Childhood stage is one of the most important stages of a human life, and many studies and researches were made for this specific stage. The early childhood represents the most crucial stage of growing up that a child would go through, as it counts as the final stage of shaping the child's personality. This stage includes a lot of changes, including physical and psychological. These changes represent the base for designing and implementing their clothes which satisfy their physiological and psychological needs and are in line with the necessity of his/her rapid growth. Children's clothes are one of the many things that represent a financial burden for the family due to the fact that once the child grows, the clothes won't fit his size any longer. Especially, if the clothes are free from the features of growth. It doesn't mean that the children's clothes must be large or very long, but by using innovative design solutions, the clothes are suitable to fit the current body size and the features of growth. The child's clothes must be suitable for many sizes of this stage and meet the child's needs. The child's clothes must be characterized by the aesthetic appearance through consideration of the aesthetic and decorative aspects.

This research aims to create design solutions to increase the usable time of children's clothing in early childhood by using appropriate production requirements which adjust the clothes size in the longitudinal and girth directions. Automated embroidery technology will be used to enrich the aesthetic aspect of innovative design solutions. The results of the research included creating ten designs for children in early childhood which carry the features of growth, so that its size can be adjusted in the longitudinal and girth directions using innovative design solutions with decorative design that is suitable to this stage. Four designs were implemented for age group (3-4-5 years) using 100% cotton fabrics, mixed by 67 cotton / 33 polyester. Automated embroidery technology was used in implementing the decorative designs. To verify the research aim, an estimation scale was designed to measure the degrees of adjusting the measurements of the implemented designs to fit more than one size in early childhood (3-6 years) by specialists in the field of clothing and textiles. The statistical analysis of the estimation scale indicates that the average degrees of adjusting measurement for the four implemented designs ranged from (22.433-50.704), and that the value of (T) ranged from (0.522-1.035), which are non-statistically significant values that perform the research aim.

Keywords:

Early childhood- Children's fashion designs- growth features- automated embroidery.

1. Introduction

Childhood is the main topic for many studies and researches in various fields. Among the basic rights of the child providing him/her with clothes that meet their needs and requirements, through clothing the features of his personality are formed, and he gains his self-confidence and capabilities; Therefore, concerning on children's clothing elements, such as: design, colours, and materials has become an important and vital requirement. Through clothes the needs of children are being satisfied according to the requirements of each stage of growth. The designer of children's clothes must understand the requirements and needs of the child in various stages of growth. He must know the way in which the child's body shape changes according to growth at every age, periods of rapid growth, and slow growth.

Early childhood (3-6 years) is characterized by rapid growth, but slower than its speed in the cradle stage. It is characterized by an increase in the tendency to motor and muscular activity, physiological balance, and independence. A child at this stage graduates being independent. So this stage is considered as the psychological weaning stage. During this stage the individual differences in children in terms of height and weight are clarified; therefore, it is necessary to take these differences into account when designing clothes for this age group.

The child's growth at this stage is rapid. So the requirements of rapid growth when implementing and choosing his clothes is necessary in order to wear them as long as possible. Therefore, it is necessary to consider choosing clothes that can be used if the child has grown up, its fabrics are characterized by elasticity or a waist line that contains rubber or a yoke that ends with ruffles, wide armpits and continuous sleeves (raglan-kimono), and long pleats. It is also preferable to choose clothes that can be used if the child grew longitudinally, which have horizontal pleats at shoulders or an extra folded fabric at hem and cuffs which can be loosened when needed or straps that contain buttons that can be relocated to achieve the increase in length. It is important to choose appropriate production accessories such as zippers and buttons from good materials that are not consumed quickly.

Research problem:

In view of the rapid growth that the early childhood is characterized by, many families face the problem of the repeated purchase process and the burden on the family economy, especially if there is no convergence in the children's ages that allows the exchange of clothing items among them. So the researchers tried to find appropriate solutions to increase the usable time of the children's clothes in the age group (3-6 years), by creating design solutions, and employing automated embroidery technology in clothes that can be increased in size to meet the growth needs at this age group, and add aesthetic values to the child's clothes.

Research importance:

- Achieving an economic return by increasing the usable time of children's embroidered clothes during the early childhood (3-6 years).
- Enriching the field of children's garment decoration in a new way that is depending on automated embroidery to increase the usable life of the child's clothes.

Research aims:
- Creating design solutions to increase the usable time of children's clothes in early childhood by using appropriate production requirements to adjust the size of the clothing in the longitudinal and girth direction.
- To benefit from automated embroidery technology to enrich the aesthetic aspect of creating design solutions.

Research hypotheses:
- There are no statistically significant differences between the average levels of adjusting the measurements of the children's clothes to be suitable for wearing more than one size in the age group (3-6 years).

Research limits:
- Children's clothes (girls) in early childhood (3-6 years).
- Automated embroidery technology.

Research Methodology:
- Descriptive analytical method with applied study.

Applied study:
Ten designs for children's clothes were created to meet their needs in the age group (3-6 years), through what was presented in the literature of the researches (child's growth in early childhood- the child's clothes need - appropriate closures for children that help to increase the clothes usable time in early childhood). The functional and aesthetic aspects were taken into account during design process. As well as the creation of design solutions that increase the size of the clothes in the longitudinal or girth directions to increase the usable time of the clothes using the appropriate production requirements (closures tools) for the child in early childhood. Appropriate decorative designs were used to add the aesthetic aspect to the design solutions. Taking into account the achievement of unity and harmony between structural and decorative design in terms of lines, colours and spaces. The program (lbis paint x) was used in drawing and colouring designs. A 2019 spring/summer colour collection was used to colour the designs. The following is a presentation of creating designs with the age group, the design solutions used, the creating decorative unit, the finishing tools, and the description of the design:

Fig. (1) First design

Fig. (2) Second design

Fig. (3) Third design

Fig. (4) Fourth design

عمر أربع سنوات

عمر خمس سنوات

Fig. (5) fifth design

عمر أربع سنوات

عمر خمس سنوات

Fig. (6) sixth design

عمر أربع سنوات

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Fig. (7) seventh design

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Fig. (8) Eighth design

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Fig. (9) ninth design

عمر خمس سنوات

عمر ست سنوات

Fig. (10) Tenth design

Four designs were implemented (Fourth-Fifth-Sixth-Eighth), which carry various ideas of creating designs solutions to increase the usable time of early childhood children's clothes by increasing the size of the design in the longitudinal and girth directions. The size of (3-4-5 years) was used. Automated embroidery technology was used in implementation of decorative designs using the Brother machine and a cotton thread (A366), the following is a presentation of designs implemented from front and back and creating design solutions that can be used:

Fig. (11) First implemented design

Fig. (12) Second implemented design

Fig. (13) Third implemented design

Fig. (14) Fourth implemented desig

Results and Discussion:

Adjusting the children's implemented clothes measurements to fit more than one size in the age group (3-6 years) was determined by designing a rating scale. It included two axes, the first axis: the design from the front and consists of (13) elements of the evaluation. The second axis: the design from the back and consists of (14) elements for evaluation, and it was presented to a group of specialized professors in order to verify the accuracy of the scale content and its items, and express their opinions on the suitability of the scale items to the content, and these arbitrators had some suggestions, and this was taken into account while writing the scale in its final form. The scale included a triple scale: two degrees of fully tuned performance, a degree of fairly accurate performance, and zero for unjustified performance. (T) test was applied to the average levels of adjusting the measurements of children's clothes in the age group (3-6 years), and the following table shows that:

Table (1) Differences in the average degrees of adjusting the measurements of children's clothes in the age group (3-6 years) for the four implemented designs:

First Design	Mean	standard deviation	Sample	Degrees of Freedom	(T) test	Sig.
First axis: Front						
Three years	24.251	2.147	16	15	0.638	0.224 Non-Sig.
Four years	23.992	2.951				
Second axis: Back						
Three years	26.442	2.358	16	15	0.815	0.391 Non-Sig.
Four years	26.712	2.019				
Total						
Three years	50.693	5.637	16	15	0.552	0.439 Non-Sig.
Four years	50.704	6.006				
Second Design	**Mean**	**standard deviation**	**Sample**	**Degrees of Freedom**	**(T) test**	**Sig.**
First axis: Front						
Four years	22.443	2.302	16	15	0.711	0.520 Non-Sig.
Five years	22.751	2.187				
Second axis: Back						
Four years	25.630	2.669	16	15	0.933	0.620 Non-Sig.
Five years	25.221	2.458				
Total						
Four years	48.073	4.987	16	15	0.437	0.338 Non-Sig.
Five years	47.972	4.152				
Third Design	**Mean**	**standard deviation**	**Sample**	**Degrees of Freedom**	**(T) test**	**Sig.**
First axis: Front						
Four years	23.702	2.511	16	15	1.035	0.882 Non-Sig.
Five years	23.281	3.096				

Second axis: Back						
Four years	26.753	2.809	16	15	0.772	0.536 Non-Sig.
Five years	27.001	3.550				
Total						
Four years	50.455	6.278	16	15	0.635	0.425 Non-Sig.
Five years	50.282	5.993				
Fourth Design	Mean	standard deviation	Sample	Degrees of Freedom	(T) test	Sig.
First axis: Front						
Four years	25.125	3.003	16	15	0.602	0.229 Non-Sig.
Five years	24.836	2.147				
Second axis: Back						
Four years	23.661	2.293	16	15	1.177	0.822 Non-Sig.
Five years	24.127	3.571				
Total						
Four years	48.786	5.122	16	15	0.554	0.344 Non-Sig.
Five years	48.963	4.627				

From Table (1), it is clear that:

- The values of (T) for each of the first axis (front) and the second axis (back) for each of the four designs are not statistically significant.

- The value of (T) was (0.552) for the total of the first design, which is not statistically significant, as the average degree of measurement for three years was 50.693, while the average degree of measurement for four years was 50.704.

- The value of (T) was (0.437) for the total of the second design, which is not statistically significant, as the average degree of measurement for four years was (48.073), while the average degree of measurement for five years was (47.972).

- The value of (T) was (0.635) for the total of the third design, which is not statistically significant, as the average degree of measurement for four years was (50.455), while the average degree of measurement for five years was (50.282).

- The value of (T) was (0.554) for the total of the fourth design, which is not statistically significant, as the average degree of measurement for four years was 48.786, while the average degree of measurement for five years was 48.963.

It is clear from the above that: The average degrees of adjusting the measurements of clothes ranged from (433, 22) to (704, 50) and that the value of (T) ranged from (0,552) to (1, 035) and they are not statistically insignificant values, thus the research aim and hypothes were achieved.

Recommendations:

- Directing designers and workers in the field of fashion design to the importance of automated embroidery to give multiple solutions that enrich this field.

- Setting design specifications concerned with both the functional and aesthetic aspects of children's clothes.

- Setting standards to increase the use of children's clothing in the middle and late childhood stages.
- The factories and industrial organizations adopt this type of research that is concerned with children's clothes in the different age stage and how to increase the usable time for them to serve the community and reduce the financial burden of families.

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