Colorful Animals Party: A Study on the Design Concept and Effectiveness of Preschool Color Teaching Aids

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Abstract

This study focuses on the educational application and effectiveness of the “Colorful Animals Party” preschool color teaching aid, including the teaching process, color learning and perception, and affective domain. Empirical studies show that the educational significance
and concrete value of this preschool color teaching aid include: 1. Combining color education with art so as to enable preschool children to learn about colors through perception and games, including color identification, matching, categorization, and combination, thereby prompting positive performance and emotional attitude, such as happiness and concentration, and enhancing for the child the color-learning experience and efficacy; 2. Putting into practice the use of gaming strategy in preschool color education, so that in addition to the preset color concept game preschool children may also play freely by means of scenario building and role-playing; 3. Providing preschool educators with possible resources for the implementation of preschool color education and the formation of an aesthetic lifestyle; 4. Supporting preschool educators in the research and development of textbooks and teaching aids so color education can be integrated into the children’s curriculum, and even their daily lives, so that color education affords opportunities for diverse manifestations and putting creativity into practice.

Key words

Colorful Animals Party, preschool color teaching aid, preschool color learning research, preschool color education, preschool color teaching
Introduction

Research background and purpose

Taiwanese public educator Yen (2011) once said that highly perceptive and empathetic talents are what the future anticipates. Positive artistic influences allow young people to stand out, no matter what profession they pursue, so the incorporation of aesthetics into education should be a matter of importance for the education system.

If aesthetic education is so important, why not start from the daily lives of preschool children? Beauty gives pleasure to the senses and soul (Ministry of Education, 2016). Jiang’s (2006) feeling was that a child who cultivates aesthetics from a young age will grow up with the ability to always see beauty in life. Schiller proposed his view of aesthetic education in “On the Aesthetic Education of Man” (1967), believing that inspiring a sense for aesthetics was beneficial to the balanced development of human sensibility and reason, as well as beautifying and elevating human nature. This needs to be achieved through art education. Dewey (1980) also used art as experience as a means of explaining the core of art education, stating that it was embedded in meaningful experiences of human life. Fan (2003) and Lin also raised the importance of practicing aesthetics in life. From this we may see that constructing artistic experience connected to daily life may be a good way to cultivate aesthetic sense in preschool children.

Guo (2001) has stated that color is a key component of visual art. It has also been
pointed out that color education is the basis of citizen aesthetics (Guo, 2007). Every brightly colored food, utensil, piece of clothing, toy, or piece of scenery may evoke preschool children’s color perception and preference. Preschool children’s daily lives are interconnected with color. Chang (2001) observed preschool children’s performances in color games and found that color may evoke learning in attitude, perception, and feelings. Color games may give preschool children interest and a sense of achievement. Chen, Wang, Chen, Chang, You & Huang (2016) created a colorful, interactive art installation and placed it in a kindergarten. It was shown to have positive effects in raising children’s level of interest in color learning.

Literature on the subject shows that other than the aforementioned studies, there are others that focus on color education for preschool children; only a handful focus on children’s perception and preference of color (Li, 2009; Song, 2013; Lin, 2010; Chen, 2000; Zhao, 2004; Pan, 2008), demonstrating that there is still much room for further research. To sum up, the purpose of this study is to provide preschool children with the opportunity to learn about color and aesthetics through games in their daily lives. In the attempt to focus on one type of preschool children-friendly color teaching aid, “Colorful Animals Party”, for empirical research and exploring its use and effectiveness, it is hoped that the teaching aid will provide preschool children with the experience of learning about color through games, and also enable preschool educators and parents looking to implement color education or make color teaching aids themselves to use it as a reference.
Research purpose and question

Based on the importance of color education, learning about color through life and games will affect children’s learning effectiveness and interest in learning. In order to continue research efforts on preschool color education by previous researchers, the purpose of this study is to explore the application of the “Colorful Animals Party Preschool Color Teaching Aid “(hereafter shortened to “Colorful Animals Party”) in teaching, and analyze how preschool children’s recognition of and affection for colors is influenced through their use of teaching aids. To that end, the issues that this study wishes to explore include: How will the “Colorful Animals Party” be applied in the teaching process? How do preschool children engage in color learning and perception? What is the affective domain of preschool children as they use teaching aids? The analysis includes the situation in which “Colorful Animals Party” is used in teaching, and the preschool children’s color learning and perception, as well as their affective domain.

Theoretical Framework of Preschool Color Teaching Aids

The theoretical framework in this section is intended to discuss the academic basis for creating the “Colorful Animals Party”. Theories regarding preschool color teaching aids affect their planning and design, and the teaching aids directly affect preschool children’s
perceptions and interest in learning about color. Therefore, the discussion will include concepts such as the meaning and strategy of color education, characteristics of preschool children developing color perception, and importance of teaching aids and games in preschool learning.

**The meaning and strategy behind color education**

Human life, activities, and customs are inseparable from the use of colors. Usage of color is even more complicated and urgent as society progresses and thrives (Wu, 1992). Uchida (1998: 14) once said: “Life is performed through colors”. Colors are used widely in daily life, and have profound effects (Lin, 1998); they are not only inseparable from our lives, but also a key component in creating visual art. Color is everywhere in our environment, whether it’s food, clothing, housing, transportation, entertainment, or work. The sceneries we see are never made up of a single color alone, but of two or more colors combined. Different colors side by side will influence one another, and create different visual effects. For example, contrasting colors will create a livelier visual effect, while coordinating colors show unity and stability. Different colors and combinations give us different visual impressions and feelings. The arrangement of homes, schools, restaurants, shops, and things like fashion choices, store signs and gift wrappings all give people different visual impressions and feelings according to their color combinations, which is why food culture worldwide strives for dishes that are
both tasty and visually appealing. From this we can see that our daily lives cannot function without color. Color enriches the meaning of life, even creating unique characteristics and tastes. Moreover, in all kinds of art displays we see an abundance of color. Color is a key component to visual art (Guo, 2001), and, as Lin (1998) stresses, it complements design in order to form perfect works of art.

It may therefore be concluded that color is the basis of citizen aesthetics (Guo, 2007); to be able to freely use colors, one must have knowledge and literacy of them. One must first learn the basic concepts of colors before being able to utilize them in life (Wu, 1992). However, when Lin (1998) examined China’s art education, it was found that teaching materials tend to ignore the fundamental meaning of color usage in daily life, resulting in lives of the public that were often filled with disorderly “visual pollution.” Color education should focus on integrating color with daily life, in so doing offering students abundant resources to learn about colors.

In the “Curriculum Outlines for Preschool Care-taking Activities” (hereafter shortened to “Curriculum Outlines”) issued by the Ministry of Education (2016), aesthetic fields defined the content of aesthetic education. In this, the domain of affective teaching focused on letting preschool children have fun in aesthetic activities, allowing them to make positive connections with experiencing beauty, so that they were happy to participate in aesthetic-related activities. Art as a teaching medium includes all kinds of sensory exploration,
as well as creating or viewing and giving feedback on artworks. In terms of visual art, the focus lies in guiding preschool children to utilize their senses to engage in the exploration of forms of expression such as themes, lines, colors, shapes, and materials. It is the preschool educators’ job to design scenarios that encourage aesthetics, and provide diverse sensory and artistic mediums, age-appropriate materials, and artistic activities, in order to stimulate interest and investigation on the children’s part. Lin (2015: 3) proposed that: “Aesthetic education is letting preschool children continuously accumulate sensory feelings and experiences that touch the heart in daily life”, stressing that aesthetic experiences accumulated in life would make appreciating beauty a custom in living and experiencing the world.

To sum up, color education is an important aspect of aesthetic education in the Curriculum Outlines, and can be implemented into children’s daily lives. The intention behind the “Colorful Animals Party” is to create a color teaching aid for preschool children that is both aesthetically pleasing and pedagogically effective. The teaching aid should be easily set up in children’s learning and living environments so that it may gradually cultivate their sense of artistic beauty and become a medium for learning about colors, thereby enabling preschool children to develop the basic concepts of color coordination and experience the beauty of colors through color games or playing with colorful objects. Next, the study will explore the development of color perception in preschool children and
systematically relate notions concerning color education and the creation of teaching aids.

**Characteristics of the development of color perception in preschool children**

According to Lowenfeld and Brittain (1957), preschool children are mostly in between the scribbling and pre-schematic stages of artistic development. Their artistic expression will progress from uncontrolled scribbling to gradually developing hand-eye coordination, and the images they produce will gradually evolve from undiscernible to recognizable objects or scenery. In terms of colors, the same authors also proposed that preschool children first use them unconsciously; they then use them to distinguish different visual meanings, before finally developing subjective color preferences. Since color preference stems from personal subjective thought, if preschool children can experience different color-learning games and use color to express emotions, the process could have a calming and clarifying effect on their emotions. Parson (1987) believed that color was very important to preschool children, especially intuitive feelings and joy evoked by colors. Wan (1998) analyzed the studies of multiple scholars regarding the development of color aesthetics, coming to the conclusion that preschool children not only start from learning the names of basic colors, but also prefer bright colors. They tend to use any color at hand, or enjoy scribbling with color, or experience the joy of playing with colors. The colors used and the object drawn have no direct connection.
To summarize, then, the preschool period is an important time for children to go from *feeling* colors to *knowing* them. Color educators should mainly broaden and make connections with the children’s life experiences, offering preschool children a chance to experience combinations of colors and shapes. That is why, in “Colorful Animals Party”, the researcher specifically created a thematic and comprehensive color learning environment using mostly highly-saturated colors, and planned fun and interactive games. The goal was to give children a more diverse color-learning experience, thereby inspiring their interest in and attention to colors.

**The significance of games and teaching aids in preschool color and aesthetic learning**

Rogers and Swayer (1988) stress that games and toys play a major role in preschool children’s growth and development. Games are a part of every child’s daily life; through playing with toys, children’s personal growth in areas such as knowledge concepts, physical strength, interpersonal relationship, emotional expression, and creativity, develops (Liu, 1993). Anthropologists and educationists point out that education is probably the biggest function of preschool toys. Playing with toys helps preschool children deal with tasks, and boosts their confidence (Jiang, 1993). Mann (1996) also pointed out that toys are teaching aids in that both are things to play with that stimulate the imagination, as well as boosting social and mental development. Liu (1993) pursued a wider definition, adopting the
perspective that teaching aids and toys were two sides of the same coin: if a toy had educational meaning it counted as a teaching aid, while teaching aids should also have the characteristics of toys. In an educational setting, teaching aids allow preschool children to learn in a more effective and enjoyable way (Li, 2000). However, in order to achieve this effect, teaching aids must cater to children’s development and needs (Lin & Zhang, 2011). To conclude, in a preschool child’s world teaching aids are toys, and toys are teaching aids; both let the child develop in a balanced way through games.

Regarding the meaning of games, famous scholars such as Plato, Fröbel, Read, Dewey, Montessori, Decroly, Bruner, Vygotsky and Piaget have all touched upon the educational power of games. From the perspective of cognitive development, Piaget (1962) emphasized that play is an important way for children to comprehend the world, categorizing it into three developmental stages: sensorimotor play, symbolic play, and games with rules. Toddlers in the preoperational stage that are starting to use language and symbols to express the world from their own perspectives, in accordance with the characteristics of symbolic play, generally engage in dramatic, imaginative, and constructive play. Also, play is key to boosting both physical and mental learning, and development. The process of playing gives children hands-on experience and sensory exploration, in tune with Dewey’s idea of learning through doing and Comenius’s educational idea of learning through the senses. Montessori’s (1937) famous dictum: “I hear and I forget, I see and I remember, I do and I understand”
reveals the effectiveness of “hands on” learning; in other words, compared to the observation and listening way of learning, games, operations, and exploration are more concrete and realistic learning experiences that will be more effective when teaching preschool children.

The “Curriculum Outlines” (Ministry of Education, 2016) also stress that preschool children naturally like games; through them they can spontaneously explore, operate, and discover while learning how to interact with people and uncover the meaning of the learning materials. Lesson plans should therefore take advantage of preschool children’s love of asking questions, exploring, and playing games, encouraging them to use their imaginations. The aforementioned studies by Chang (2001) and Chen et al. (2016) concerning preschool color education found that games and interactions aided the children’s color learning in terms of affective domain and effectiveness. However, while the first of the two studies observed that the learning environment in preschools employed “colorfulness” to create a lively atmosphere, it lacked an overall color scheme, with only some facilities and equipment being color-coded. Moreover, during the teaching process, the children’s color expression was limited by the materials given to them by the teachers. Add to these points the fact that the study was relatively dated and that although the color games were all planned in accordance with the themed preschool curriculum they were not implemented independently, there was ample justification for conducting more up to date research based on lesson plans and teaching within the framework of the new curriculum (Ministry of Education, 2016). As far
as the latter study is concerned, while the large interactive device that was designed using color was shown to have positive benefits, these are difficult to translate into popular use due to the large size of the art installation; it was thus hypothesized that preschool color learning could be better facilitated through the development of other teaching media. Even allowing for the presence of the two previous studies, there is a notable lack of research on color in preschool curriculum and teaching, the development of color teaching media, and related topics, questions that can all be explored via studies such as the current one.

To summarize the investigations made in the aforementioned literature, “Colorful Animals Party”, the color teaching aid being discussed in this study, takes into consideration preschool children’s need to learn about colors and their love of games. With interactive color games as the focal point, other important questions need to be asked: What sort of inspiration or growth could this teaching aid give preschool children? Could it be used to enhance the cultivation of children’s color perception and enable children to become more interested in learning? The point which this study, using color teaching aids as a medium, is trying to convey is that a cultivated sense of color may be used in daily life to build a visually appealing living environment, meaning that color education should be taught from a young age and integrated into the daily lives of preschool children. Games and children’s lives are interconnected; in a preschool child’s life, games are the best example of participation and learning through experience. Teaching aids are both fun and educational; therefore, teaching
aids designed with color education in mind represent a good solution to implementing color education in preschool children. The key to effectively teaching preschool children about color is making sure there are interesting color games that provide children with opportunities to interact and explore, and that these games are connected to the children’s daily lives. This research thus focuses on creating “Colorful Animals Party”, placing it in the living environments of preschool children, and enabling them to know colors by enriching their learning experiences and exploring the fun of colors through playing games.

**Research Design and Implementation**

This research examines color education, preschool children’s color perception development, and games and teaching aid theories, utilizing these elements as the basis for designing “Colorful Animals Party”. Observation methods are employed to collect data on how the children play the games, the amassed data being analyzed in order to evaluate the effect and effectiveness that the teaching aid has on preschool children’s color perception and affective domain. The research design and implementation were thus as follows:

**Subjects and sampling**

The subjects were 18 first-year kindergarten students hoping to use the “Colorful Animals Party” to raise their level of color perception and interest in learning. The research used
working time in the teaching schedule to visit the classes and observe the children playing the games in order to collect data.

**Data collection methodology and tools**

Miller (2008) analyzed the benefits of observation from an educational perspective, pointing out that observation is purposeful and organized. Observation should be done objectively, recorded, and used to infer more information. Through observation the researcher may see the actual behavior of the subject, learning how the subject’s abilities are developed, the effectiveness of learning, and whether the teaching method used is suitable. According to Tsai (1987), the observation method is a method of scientific research. Through observation, researchers can understand the occurrence of phenomena or behaviors. The main reason this research employed the observation method was due to the consideration that preschool children might have limited oral expression abilities, thus making it hard to gather data through interviews or surveys. In order to be more objective, the researcher used natural, non-participatory, descriptive ways of recording observations. Observing, recording and gathering how the children interacted with the games while they played, then evaluating how well the children used the teaching aids and learned about colors through the analysis of observation data, was the specific methodology adopted.

Structured observation means to use concrete and clear observation items and recording
methods to observe, and record, research-related activity according to the stated research purpose. The data collected through structured observation is thus easily quantified and analyzed. Non-structured observation is the opposite, since it is a more relaxed method, lacking clear items of observation, and using descriptive language to describe the subject’s behavior (Wang & Wang, 2011). The research design for the present study combined both structured and non-structured observation methods in a “Preschool Children Learning Observation Form” (hereafter shortened to “Observation Form”), its contents including clear observation items and descriptive records. The observation form was formatted in the following order: Type of Data- Game Theme- Child Number, e.g., Observation- Bear- 001, Observation= observation form, Bear= Bears Get Ready for Winter, 001= first child subject.

“Colorful Animals Party” included six games, and the researcher designed six observation forms according to the purpose of each game. Every observation form had three to four items, as demonstrated in Diagram 1, in order to collect data on preschool children’s color learning situation and results. The observation form for “Bears Get Ready for Winter” mainly focused on whether the items collected by the children were really colors similar to brown; “Birds Build Nests” observed whether the children could successfully match the color of the bird nest stand to the bird nest; “Missing Bird Eggs” noted whether or not the children could successfully sort out the different colored eggs; “DIY Fish Cookies” and “Ducky Artist” recorded if the children were able to identify different colors from color-mixing cards;
finally, “It’s Fun to Line Up” focused on the ability of the children to line up the animals according to the lightness and darkness of colors. Every observation chart included a column for recording anecdotes, thereby allowing observers to record interesting incidents that occurred when the young children were using the teaching aids.

<table>
<thead>
<tr>
<th>&quot;Bear Gets Ready for Winter&quot; observation items</th>
<th>&quot;Birds Building Nests&quot; observation items</th>
<th>&quot;Missing Bird Eggs&quot; observation items</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Whether the children put the item with the right color.</td>
<td>• The children may correctly match the color of the bird nest to the corresponding stand</td>
<td>• The children's choice of bird eggs</td>
</tr>
<tr>
<td>• How many similarly colored objects the children found</td>
<td>• The way the children operate the nests and stands</td>
<td>• How the children sorted the bird eggs</td>
</tr>
<tr>
<td>• How the children felt about playing the game</td>
<td>• How the children felt about playing the game</td>
<td>• Whether the children correctly sorted the bird eggs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>&quot;DIY Fish Cookies&quot; observation items</th>
<th>&quot;Ducky Artist&quot; observation items</th>
<th>&quot;It's Fun to Line Up&quot; observation items</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The children's chosen question and answer card</td>
<td>• The children's chosen question and answer card</td>
<td>• Whether children were able to differentiate the light and dark colors of the animals</td>
</tr>
<tr>
<td>• Whether the children understood correct color mixes</td>
<td>• Whether the children understood correct color mixes</td>
<td>• The animals that the children played with</td>
</tr>
<tr>
<td>• How the children felt about playing the game</td>
<td>• How the children felt about playing the game</td>
<td>• How the children felt about playing the game</td>
</tr>
</tbody>
</table>

Diagram 1 Structural Observation Items on the Observation Charts for Six Types of Games

Design and Creation of the “Colorful Animals Party”

Meaning and purpose

“Colorful Animals Party” was designed based on analyses conducted by Lowenfeld, Brittain
(1957) and Parsons (1987) on the important role color plays in the learning and development of young children, Piaget’s (1962) proposition that using language and symbols to conduct symbolic play is a characteristic of children’s pre-operational development, and the Curriculum Outline’s (Ministry of Education, 2017) emphasis that preschool children should be given the opportunity to learn through autonomous exploration, operation, and discovery. The teaching aid primarily encompassed a teaching aid backpack that is easy to carry and store, and different colored animal-shaped objects such as brown bears, red birds, orange fish, yellow ducks, and green frogs. Each animal comes in five different tones of the same color.

In terms of the contents of aesthetic learning, six interconnected games of increasing difficulty, which include color identification, matching, categorization, and combination, were designed using original stories about these five animals based on the learning indicators for the aesthetic field for children in the first year of preschool as defined in the “Curriculum Outlines” (Ministry of Education, 2016). As Diagram 2 shows, allowing young children to explore the beauty of the colors, forms, and textures of the teaching aids with their senses, undergo different aesthetic experiences, and enjoy the fun of using these teaching aids to play and create while learning about the basic concepts of color, can be seen as a continuation study of the large interactive art installation color education study conducted by the researcher and students in 2016, although the two studies differ in the appearance of teaching aids, the size of objects, and the improvements and advancement of color educational content.
The research can also be used in advanced color education.

<table>
<thead>
<tr>
<th>Name of the game</th>
<th>Concept of color to learn</th>
<th>Animal protagonist</th>
<th>Storyline</th>
<th>How to play</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Bears Get Ready for Winter&quot;</td>
<td>Identification of Similar Colors</td>
<td>Brown bear</td>
<td>The bear is preparing for winter, we need to the learning environment find something close through original stories. First, to the color of the identify similar colors, then bear, so that it can find something close to the spend a warm winter. color of the bear's body, then put it in the bear's house.</td>
<td></td>
</tr>
<tr>
<td>&quot;Birds Building Nests&quot;</td>
<td>Color Identification and Matching</td>
<td>Red bird</td>
<td>The mama red bird is about to hatch her of different colors onto the eggs, please help her make a home. Velcro, then begin engaging in color identification by placing birds into the nest with the same color.</td>
<td></td>
</tr>
<tr>
<td>&quot;The Missing Bird Eggs&quot;</td>
<td>Color Identification and Categorization</td>
<td></td>
<td>The red bird's eggs all Sort the scattered and fell under the tree, differently colored eggs into please help put the categories, then place them in eggs back where they the nest of the same color belong.</td>
<td></td>
</tr>
<tr>
<td>&quot;DIY Fish Cookies&quot;</td>
<td>Color Combinatation and Identification</td>
<td>Orange fish</td>
<td>What color cookies do you want to feed fish today? Try making it yourself! and find the cookie card of the same color. Put both cards in the storage space, and pick the cookie of the same color to feed the fish.</td>
<td></td>
</tr>
<tr>
<td>&quot;Ducky Artist&quot;</td>
<td></td>
<td>Yellow duck</td>
<td>What colored duck do you want to draw duck card, then identify and today? Which two find the card that will create colors made the color the color on the duck once of this duck? folded. Put both cards in the storage space.</td>
<td></td>
</tr>
<tr>
<td>&quot;It's Fun to Line Up&quot;</td>
<td>Identification of Light and Dark Colors</td>
<td>Five animals</td>
<td>It's time for the Move each animal one by one animals to gather and one to the grass field in the exercise! How should center, then identify and the animals line up? arrange them into lines lightest color to darkest, or darkest to lightest!</td>
<td></td>
</tr>
</tbody>
</table>

Diagram 2 Design Content of the “Colorful Animals Party” Children’s Color Teaching Aid
Design and creative process

“Colorful Animals Party” is an extension of a former experiment using color interactive installation art to explore the implementation of preschool children’s color education conducted by the researcher and students in 2016. As can be seen in Diagram 3, designing and coming up with the concept, confirming the core values and color education concept of the teaching aid, planning a rough sketch (followed by discussion and revision), finalizing the design, preparing suitable materials, and conducting another discussion and revision session, all had to be accomplished before it was completed. The first discussion and revision session focused on adjusting the core values and design of the teaching aid, as well as materials and connection between games; the second dealt with the effects of the teaching aid.

Diagram 3 “Colorful Animals Party” Design and Creative Process
Materials and techniques

The “Colorful Animals Party” comprises two main parts: a backpack and the animals. The backpack was made by molding and sewing, and colored with paint; the main materials used were cardboard, canvas, paint, magnets, and yarn. The animals were made with papier-mache and paint (using both wet and dry brush strokes); newspapers and tape were used first to create the basic shape, followed by napkins, glue, and paint to create the outward appearance.

Creative process

The creative process of “Colorful Animals Party”, as shown in Diagram 4, included 3D molding, layering the surface, drying, painting, and a final drying process.
### Creative Process

<table>
<thead>
<tr>
<th>Teaching Aid Backpack</th>
<th>Step 1. → Use canvas and cardboard to make the backpack design</th>
<th>Step 2. → Paint the backpack teaching aid and game environment, then use dry brush techniques for a layered effect.</th>
<th>Step 3. → After coloring, leave to dry for 2 to 3 days, and its finished.</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Backpack teaching aid&quot;</td>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
<td><img src="image3.png" alt="Image" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Animals Protagonist</th>
<th>Step 1. → Use newspapers and tape to form the shape of the animals.</th>
<th>Step 2. → Layer napkins onto the animal and coat with water-glue mixture, let dry for 1 to 2 days.</th>
<th>Step 3. → After painting the animals, leave to dry for 1 to 2 days.</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Brown bear&quot;</td>
<td><img src="image4.png" alt="Image" /></td>
<td><img src="image5.png" alt="Image" /></td>
<td><img src="image6.png" alt="Image" /></td>
</tr>
<tr>
<td>&quot;Red bird&quot;</td>
<td><img src="image7.png" alt="Image" /></td>
<td><img src="image8.png" alt="Image" /></td>
<td><img src="image9.png" alt="Image" /></td>
</tr>
<tr>
<td>&quot;Orange fish&quot;</td>
<td><img src="image10.png" alt="Image" /></td>
<td><img src="image11.png" alt="Image" /></td>
<td><img src="image12.png" alt="Image" /></td>
</tr>
<tr>
<td>&quot;Yellow duck&quot;</td>
<td><img src="image13.png" alt="Image" /></td>
<td><img src="image14.png" alt="Image" /></td>
<td><img src="image15.png" alt="Image" /></td>
</tr>
<tr>
<td>&quot;Green frog&quot;</td>
<td><img src="image16.png" alt="Image" /></td>
<td><img src="image17.png" alt="Image" /></td>
<td><img src="image18.png" alt="Image" /></td>
</tr>
</tbody>
</table>

**Diagram 4 Creative Process of the “Colorful Animals Party”**
Teaching demonstration and data collection

As shown by Piaget’s (1962) child play development and the “Curriculum Outline” (Ministry of Education, 2017) perspective on creating play scenarios, the act of “play” can help young children learn happily through hand-on experiences, with educators mainly playing the role of creating scenarios that are beneficial to children’s aesthetic exploration and discovery. Based on these ideas, the education implementation plan of “Colorful Animals Party” includes four stages: 1. Building the children’s motivation; 2. Guiding the children to make contact with and observe the teaching aids; 3. Helping the children understand the games and their rules, and; 4. Enabling the children to play the games.

The teaching demonstration of this research study was done in November 2015, and a total of 18 first year kindergarten students participated. 108 (100%) valid observation forms from six different games were collected and quantified for data analysis. The observation items were quantified, and the results and effects of the preschool color education inferred from the data. The descriptive part of the observation form, on the other hand, allowed the researcher to better understand the conditions and status of the children’s color learning.

Results and Discussion

This research divided the findings of data analysis into two aspects for discussion: the application process of the teaching aid, i.e the children’s process of using the teaching aid,
and the children’s feedback from using the teaching aid.

The application process of “Colorful Animals Party”

The process of children handling the color teaching aids according to the aforementioned education implementation plan is illustrated in Diagram 5, as follows:

<table>
<thead>
<tr>
<th>1. Advanced notice and inspiration of anticipation</th>
<th>2. Viewing and teaching aid and developing curiosity</th>
<th>3. listening to the story and learning how to play</th>
<th>4. using and understanding the teaching aid</th>
</tr>
</thead>
</table>

![Diagram 5 Process of Preschool Children Using “Colorful Animals Party”](image)

Tell children about the activities in advance, build up anticipation and motivation

Hofer (2006) noted that positive learning motivation was beneficial to the effects of education, meaning that encouragement is an important part of a teacher’s job. Kember (2006) pointed out that teachers are responsible for encouraging students’ learning motivation, and for exhibiting high expectations regarding their learning performance. This means that increasing motivation is the first step when conducting educational activities. Therefore, this research required that teachers verbally told the children about the activity in advance by
asking kindergarten homeroom teachers to help introduce this teaching aid experience so that children would harbor high expectations for the “Colorful Animals Party”.

Guide children to familiarize themselves with the teaching aids by exploring with their senses and thereby generate a sense of curiosity

Verbally guiding children to observe and touch teaching aids further increases their learning motivation. During this stage, children not only exhibit curiosity towards the teaching aids, but also discuss the composition of the teaching aids among themselves, such as the types of animals, colors, and features of the animals’ habitats.

Let children get to know the games and their rules through animal stories

This stage mainly consists of introducing the rules of the six games through animal stories. Researchers tell stories as they guide children to practice handling the teaching aids, and discuss with the children things they need to be aware of.

Young children engage in play and understanding, thereby gaining color learning experience

During this stage, children start playing the games, gaining color learning experiences and understanding in the process. How the children interacted with the “Colorful Animals Party”
color teaching aids is as illustrated in Diagram 6.

To summarize, the application process of “Colorful Animals Party” comprised four main stages: building motivation through telling the children about the activity in advance, providing them with the guidance necessary to explore with their senses, familiarizing them with the game and the rules, and, finally, playing the actual game. This process provided the children with step-by-step guidance on how to interact with this teaching aid from their initial expectations, their subsequent curiosity from contact leading to understanding the game, and actually playing the game itself. Simply providing young children with the teaching aids may not be enough; if they are used in the systematic manner described above, the desired teaching results should be achieved. The teacher thus plays an important role in the design of the teaching process.
<table>
<thead>
<tr>
<th>Game activities</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Bears Get Ready for Winter&quot;</td>
<td>The children select colors similar to the color brown and put it in the brown bear's home.</td>
</tr>
<tr>
<td>&quot;Birds Building Nests&quot;</td>
<td>The children matched the color of the nests, and placed nests and stands of the same color onto the tree.</td>
</tr>
<tr>
<td>&quot;The Missing Bird Eggs&quot;</td>
<td>The children put the bird eggs scattered on the ground back in nests of the same color.</td>
</tr>
<tr>
<td>&quot;DIY Fish Cookies&quot;</td>
<td>The children folded the color-mix card and observed the color it made, then found the same colored card, and fed the same colored cookie to the fish.</td>
</tr>
<tr>
<td>&quot;Ducky Artist&quot;</td>
<td>The children first drew a one-colored duck card, and then found the color-mix card that would make the same color once folded.</td>
</tr>
<tr>
<td>&quot;It's Fun to Line Up&quot;</td>
<td>The children lined the animals up in the center plains according to lightness and darkness of color.</td>
</tr>
</tbody>
</table>

Diagram 6 How Preschool Children Use “Colorful Animals Party”
Preschool Children’s Behavior and Response to Using Color Teaching Aids

In this research, “Colorful Animals Party” was introduced into the children’s learning environment so that they could enjoy the fun of engaging in color games and playing with colorful objects that stimulated their senses. As previously described, due to limitations in the ability of three-four year-old children to express themselves verbally, the observation method was the primary approach adopted.

How Preschool Children Behave When Playing the Games, and Effect of Color Education

Analysis was conducted depending on how the children played each game and the effect this had in terms of color education.

A. “Bears Get Ready for Winter”

The aim of “Bears Get Ready for Winter” is to teach children about similar colors and let them determine for themselves which colors are similar to brown. From observing game play, it was found that 83% of the children found all the objects similar to the color brown and placed it in the “Brown Bear” home, and that 17% of the children found a portion of the objects. It was therefore deduced that the children could identify similar colors through play; however, every child’s ability to identify similar colors varied, so teachers should keep this in mind when conducting the lesson.
B. “Birds Build Nests”

“Birds Build Nests” aims to match colors. All of the children were able to stick the bird nest stand onto the tree and put in a nest of the same color. By analyzing how the children completed this game, it was found that they played this game according to their personal preference: 61% stuck the stand onto the tree first, then put in the corresponding nest; 33% chose to put up all the stands before putting in nests; and 5.6% used a mixture of the two methods. Different methods of play reflected the plurality of artistic creation and expression, which teachers should respect.

C. “Missing Bird Eggs”

The main task in "Missing Bird Eggs" is to sort out colors. The children should put the eggs back in the nest with the corresponding color. Studies showed that all of the children successfully sorted the eggs. When sorting the eggs, 72.2% of the children will put all the eggs of one color into its nest before moving on to the next nest, but the order of the colors selected varied from child to child, 27.8% took eggs regardless of color and placed them in the correct nests.

D. “DIY Fish Cookies” and “Ducky Artist”

Both “DIY Fish Cookie” and “Ducky Artist” require the children to learn to identify mixed
colors. Children studied how colors mix by observing color-mix cards made with cellophane. 61.1% were able to identify orange and green after mixing the colors, but only 61.1% could correctly identify purple. (One possible cause for this was that the color-mix card made with red and blue cellophane created a purple that was quite different from the purple of the cookie.) While on the one hand the research suggested that conducting further discussions pertaining to this issue could be beneficial, on the other the game provided children with the opportunity to change their answers, meaning that they could play over and over again in order to sort and correct their color-mixing results.

E. “It’s Fun to Line Up”

The purpose of “It’s Fun to Line Up” is to let children learn how to tell light colors and dark colors apart. When playing this game, it took the children a longer time to think about the task, but all were able to get the right answer. Each child chose to work with animals in a different order. For example, one child followed the order of fish, bear, duck, frog, and bird (Observation-Line-001); another, fish, frog, duck, bear, and bird (Observations-Line-006). When lining up the animals, each child should keep moving and correcting the order until he or she is satisfied (Observation-Line-001, 007, 010, 012); there was one child who completed the game with the teacher’s guidance and hints (Observation-Line-008) An interesting anecdote pertained to one preschool child who lined up all the fish and said, “They are
sleeping” (Observation-Fish-008); another child imitated the movement of the animals, like flying, swimming, jumping and walking, while lining up the animals (Observation-Line-001). From observing how the children engaged with the game, it was clear that they were able to use their imagination to make certain visual connections.

To conclude, “Colorful Animals Party” echoes the intentions of the Curriculum Outline (Ministry of Education, 2017) elements of aesthetic domain and understanding of the characteristics of play by providing children with a color learning experience wherein they play through sight and touch, learn concepts such as similar colors, sorting colors, mixing colors and light/dark colors, and experience the wonderful changes in colors. What’s more, all six games that can be played with “Colorful Animals Party” allow children to express their subjectivity and play with the game pieces in different ways or orders, as well as to correct themselves through repeated game play in the process of learning about color perception.

**Affected domain displayed by the preschool children**

“Colorful Animals Party” provides children with a scenario for color exploration and play, thereby generating positive attitudes throughout the course of the games. It puts into practice the Curriculum Outline’s (Ministry of Education, 2017) emphasis on educational principles such as “provision of sensory exploratory experience” and “planning of aesthetic scenarios for exploration”. From what the preschool children displayed while using “Colorful Animals
“Colorful Animals Party”, it appears that this color teaching aid is very attractive to them. Observation of the children’s expressions and actions all showed them to be happy, curious, enjoying themselves, and other positive interests and affected domains. For example, one child said that sorting bird eggs (helping eggs finding their homes) was fun (Observation-Eggs-003); another said that it was fun to sort the animals into lines by color, and that they could play again and again (Observation-Line-006); yet another said they enjoyed making different colored fish food (Observation-Fish-018). Some children play-acted outside the way the six games were designed by using the animal objects provided, e.g., free role-play involving birds looking for insects (Observation-Egg-005), or fish and frogs playing hide-and-seek (Observation-Line-008), thereby demonstrating that this teaching aid has the potential to inspire spontaneous exploration in preschool children. It can thus be inferred from this that “Colorful Animals Party” can be used for independent play, a potential topic for future research.

**Conclusion and Suggestions: Encourage Diverse Development and Application of Teaching Aids, to Further Innovation and Practice in Preschool Color Education**

This main purpose of this study was to explore how the preschool children’s color teaching aid “Colorful Animals Party” could be used as part of the teaching process, and its influence on children’s color learning and perception as well as their affective domains as they play
with the teaching aid. To this end, the questions this study wished to explore included: How is “Colorful Animals Party” used in the teaching process? What is the staff of preschool children engaging in color learning and perception? What is the affective domain of children playing with the teaching aids? The aspects of analysis include: The status of preschool children playing with “Colorful Animals Party”, their color learning and perception, and their affective domain.

The main purpose of this study was to try to understand the educational value of color teaching aids by exploring the practical application of “Colorful Animals Party” in the teaching process and the children’s color learning, perceptions and affective domains through the use of teaching aids. This was to encourage diversity in the development and application of teaching aids, as well as increase innovation and improve actual practices in children’s color education. Based on the findings and discussion, more profound conclusions and suggestions for follow-up research are as follows:

**Color teaching aids inspire children’s perceptions of color and interest in sensory learning**

At a time when art and design are fundamental, aesthetic literacy is one of the crucial traits that our children must develop in order to stay competitive. We should therefore give children chances to cultivate a sense of aesthetics as part of their daily lives. Color not only draws
children’s attention (not least because it appears in every aspect of life), it is also fundamental
to visual aesthetics. Bearing the aforementioned related ideals about preschool color teaching
aids in mind, this research created “Colorful Animals Party” as a color teaching aid especially
for preschool children. The design incorporated game strategies, in the hope of bringing color
education into the daily lives of children, and employed games as a means of enabling them
to cultivate a sense of color.

For preschool learning, the use of teaching aids through playing games can stimulate
children’s mental and physical development (Liu, 1993), making learning more effective and
fun (Li, 2000). Following and exploring the rules of the game can be seen as another form of
learning. The “Colorful Animals Party” uses five different colored animals to attract
children’s attention, and designs color games with different teaching objectives using animals.
It then systematically guides children step by step towards making contact and interacting
with the teaching aid. It also uses color games with different teaching goals to give children a
hands-on approach to learning about and perceiving color. According to the results of this
study, this color teaching aid, to a certain level, enhanced the children’s perception of color
and interest in sensory-enabled learning. As a result, it may represent a viable option in terms
of spreading color education.

Furthermore, when considering the application of teaching aids in teaching, the Ministry
of Education’s (2016) guidelines for aesthetic education include the index of using the five
senses to feel all kinds of beauty in life, thereby making it a mission for this color teaching aid to provide sensory exploration. Since senses form the basis from which learning takes place, so learning in turn helps to develop the senses. Comenius (1986) believed that the use of different senses was to stimulate learning, and that it was the responsibility of educators to promote the use of their students’ sensory capacities. Montessori (1937) believed it was imperative that children receive sensory education from a young age: sensory education not only allows mankind to adapt to modern life, but it also promotes everyday practices. Lowenfeld and Brittain (1957) stressed that learning can only happen through the senses, that sensory experience is important to childhood development, and that it should be a continuous process. The stimulation of sensory capacities may specifically be encouraged through art education. Also, the “Colorful Animals Party” preschool color teaching aid provides other possibilities for art classes, letting preschool children learn about colors through sight and touch.

The central idea of aesthetic education within the Curriculum Outlines is that aesthetics should please the senses and soul (Ministry of Education, 2016). Based on the positive reactions of the preschool children after playing with the “Colorful Animals Party”, it was clear that this color teaching aid not only helped them learn but was also pleasing to the eye and provided them with the space to freely explore. Consequently, this teaching aid not only serves the function of letting children learn about colors through games, but it also be placed
in a kindergarten classroom or a corner at home for children to passively view it or actively play and create in it at will. It also incorporates art education into the daily lives of children, thereby becoming a good way to cultivate their aesthetic appreciation. A good color teaching aid should not only be aesthetically pleasing, but also, as explained by Hicks (2004), provide an endless amount of games. This means that children should be allowed to use what they have learned while playing the color games as a basis to be creative, and, through these creative free-play experiences, cultivate their own aesthetic sense and values.

To sum up, this research uses color as the theme for designing and creating this preschool teaching aid. Its meaning and value lies in: 1. Encompassing both color education and art, prompting preschool children to learn about and perceive color through games, through approaches such as color identification, matching, categorization, and combination, and stimulating positive feedback and affective domain towards learning about colors, such as happiness and concentration, thus enhancing the learning experience and effectiveness; 2. Putting into practice game strategy in children's color education, other than the six designed games, children can also engage in creative free-play such as scenario building and role playing; 3. Proven a viable resource for educators, caretakers, and parents to implement color education for preschool children and create an aesthetic living environment. Other than what is mentioned above, animals are a subject many children are attracted to. The "Colorful Animals Party" teaching aid discussed in this research uses animals and their natural habitats
as a subject, and can also be used to teach children about animals as an added value to the teaching material.

Finally, since this research on the “Colorful Animals Party” and its effects contains some imperfections, what follow are some suggestions for future studies:

**Improve the operability of “Colorful Animals Party”**

In order to improve the operability of the “Colorful Animals Party”, tactics that the researcher came up with included: 1. Choosing less sticky paints to lessen the tackiness on the animals’ surfaces.; 2. Adding a drawing of a bird’s nest to the front of the stands used in “Birds Build Nests” in order to help the children recognize the right way to place it; 3. Choosing different materials for the cards used in “DIY Fish Cookie” and “Ducky Artist” in order to improve durability. In addition, the purple made by overlapping blue and red cellophane was different from the purple of the cookie, and should be improved upon.

**Enhance the credibility of the study**

The subjects of this research were 18 first year kindergarten students. This was only a preliminary study to test the effect of the teaching aid. In consideration of how preschool children between three and four years of age have limited capabilities in expressing themselves verbally, observational methods were mainly used to record how children
interacted with the teaching aids. Later studies could focus on enhancing credibility, with particular suggestions as follows: 1. Widen the range and sample size of subjects; 2. Collect more long-term data to see how children interact with the teaching aid and use the teaching aid to engage in free-play; 3. Interview educators, caretakers, and parents to collect feedback regarding the teaching aid, in order to improve upon the teaching aid.

**Encourage further diverse display and creative implementation of preschool color education**

By way of a continuation of the first conclusion, “Colorful Animals Party” may be used as a supplementary resource and teaching material for the teacher to engage in preschool children’s color education. It mainly combines sensory operating and the idea of learning through games, so that children may watch, touch, interact with it, and also freely create their own games. Its potential advantages include: gaming qualities, its educational possibilities, especially in terms of color, and its unique and handmade nature. It is also easy to store and carry. It is hoped that through the ideal and creative process, as well as the effectiveness of children’s reception of this color teaching aid, that educators and caretakers will be inspired to develop their own color teaching materials or handmade teaching aids, thereby bringing color education to preschool children’s classrooms and from there to their daily lives.

Suggested pathways for subsequent researchers are as follows:
Expand the contents of the “Colorful Animals Party”

Using the “Colorful Animals Party” as a basis for extending color game content and objects, additional components, including more layers of light/dark colors on the animals themselves, the amount and types of animals, mixing up colors, and including color cards of different games, can all be considered.

Develop other teaching materials / teaching aids linked horizontally and vertically to this teaching aid

To further children’s experiences of color concepts and applications, other teaching materials linked horizontally or vertically to this aid may be developed and tested. (The former term refers to using other themes that children will find interesting to create similar teaching aids; the latter, to providing further learning goals, such as designing environments in different tones and providing different colored objects for children to play with, in order to strengthen children’s color matching experiences.) Preschool color education is an important issue, and its diverse representations rely on the concerted efforts of educators and parents, as well as their creative applications, so that color education may be more widely popularized and practiced within our everyday lives.
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