

The Exploration of Children Needs and Preferences for Museum Cultural and Creative Products Based on Child Cognitive Development Theory

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Abstract: *The role of Museum Cultural and Creative Products (MCCPs) in cultural dissemination and education is gradually gaining attention. However, there is still a lack of systematic research on the differentiated needs of children of different age groups. Based on the theory of children's cognitive development, this paper explores the needs and preferences of children aged 6-15 for museum cultural and creative products through a questionnaire survey. It is found that children aged 6-8 prefer products with bright colors and strong operability; children aged 9-11 tend to prefer educational and intellectual products; and adolescents aged 12-15 prefer products with cultural depth and personalized expression. In addition, digital technologies (e.g., AR and VR) significantly enhance the attractiveness and educational effect of cultural and creative products. This paper not only enriches the theoretical research on children's cultural consumption behavior, but also provides practical suggestions for the design and promotion of museum cultural and creative products.*

Keywords: Museum Cultural and Creative Products, Children's Cognitive Development, Children's Needs

1. Introduction

Museums are places where historical artifacts are collected and displayed, and they have gradually become an important part of the cultural and creative industries (Wang, 2022). Museums play an important role in the protection of natural and human social memory, the transmission of history and culture, education of the public, preservation of cultural heritage, leisure, and entertainment, and have become an indispensable and important part of the life of human society.

The creative transformation and innovative development of museum cultural resources have always been a concern of society (Chen & Liu, 2021). In recent years, museums have increased their sources of income through the development of creative cultural and creative products while allowing audiences to come into deeper contact with and experience cultural heritage in their daily lives, which actively enhances the public's sense of cultural identity and participation, promotes cross-disciplinary cooperation and exchanges among designers, artists,

and educational institutions, drives the development of the local economy, and facilitates the growth of the relevant industrial chain (Zhao,2019).

Museum cultural and creative products, if presented in a lively and interesting form, can quickly attract children's attention and stimulate their curiosity and desire for knowledge. After coming into contact with these products, children can participate in learning more actively and enjoy the fun of exploring knowledge. Museum cultural and creative products are important educational resources with significant educational value, which can be used as a supplement to school education, providing diversified learning materials and tools to help students understand and master knowledge more intuitively (Zang,2021).

The theory of children's cognitive development describes the process of children's cognitive development and emphasizes the way children understand the world at different ages. Children's cognitive abilities develop gradually with age, and their needs and preferences are profoundly affected by various stages of cognitive development (Piaget, J. 1970). Children between the ages of 6-15 are in the stage of concrete and formal operations, and they show significant differences in cultural understanding, learning interests, and purchasing behaviors.

This paper aims to explore in depth the diversified needs and preferences of children aged 6-15 for museum creative products through research questionnaires based on the theory of children's cognitive development, to reveal the core features of children's needs, to provide theoretical support and practical guidance for the design and promotion of museum creative products, to realize the organic combination of educational value, cultural inheritance, and market demand. Therefore, this paper tries to answer the following questions according to the following research objectives:

Research Questions:

- a) What are the needs and preferences of children aged 6-15 for museum cultural and creative products?
- b) How can needs and preferences be integrated into the design of cultural and creative products?

Research Objectives:

- a) To identify the needs and preferences of children aged 6-15 years for museum cultural and creative products.
- b) To integrate Children's Needs and Preferences into Museum Cultural and Creative Product Design.

2. Literature Review

The impact of museum cultural and creative products (MCCPs) on children is multifaceted. These products integrate knowledge from various disciplines such as history, art, and science. Through interacting with MCCPs, children not only gain rich knowledge but also improve key skills, including observation, critical thinking, and creativity (Zou, 2015).

Recent studies on MCCPs and children primarily focus on areas such as cognitive development, creativity enhancement, cultural identity, and strengthening parent-child relationships. Feng et al. (2022) highlighted that MCCPs combining traditional culture with game design effectively stimulate children's initiative and creativity. Cheng (2023) emphasized that age-appropriate designs are crucial for helping children understand and connect with

museum culture. Interactivity and participation are recognized as essential factors in fostering children’s innovative thinking (Zou, 2015). Products designed according to children’s psychological characteristics further boost their creative abilities (Tao, 2011). Research on the Forbidden City’s MCCPs by Wang (2021) revealed that incorporating regional characteristics and cultural heritage into product designs allows children to experience and appreciate traditional culture in their daily lives. Similarly, Miao (2019) pointed out that blending innovative designs with cultural elements not only conveys rich cultural information but also strengthens children’s cultural identity and national pride. Qiu et al. (2023) observed that multimodal sensory experiences and parent-child collaborative product designs enhance family interactions and emotional bonds. Xie et al. (2020) further emphasized that products focusing on parent-child interaction not only improve family relationships but also increase children’s interest in and understanding of cultural content.

Natural interactive experiences also play a significant role. Zeng (2021) noted that such experiences can deepen children’s emotional connection to museum culture and support their social development. With the rise of digital technologies, virtual reality (VR) and augmented reality (AR) are becoming important tools in MCCP design. Hou (2016) suggested that using modern technology to create interactive experiences for children improves the entertainment and appeal of MCCPs while enhancing their interest in and understanding of museum culture. Research on the "Fun Bronze Characters" program in Beijing by Cui (2018) demonstrated that combining education and fun through interactive courses significantly enhances children’s learning outcomes.

Current studies mainly discuss the impact of MCCPs on children without focusing on age-specific differences. Research on children’s intrinsic needs and preferences for MCCPs remains limited. Since children are in a dynamic phase of cognitive development, age significantly influences their needs and preferences. Further studies are needed to address these age-specific factors comprehensively.

3. Methodology

This paper uses a questionnaire survey to explore the needs and preferences of children aged 6-15 for museum cultural and creative products (MCCPs). To ensure the representativeness and reliability of the findings, six culturally and regionally diverse cities in China—Beijing, Shanghai, Nanjing, Wuhan, Hefei, and Shaanxi—were selected as the main data collection sites. These areas reflect various cultural backgrounds, economic levels, and educational resources, providing a comprehensive overview of school-aged children's needs for MCCPs in China.

3.1 Data Collection

The paper adopted convenience sampling and collected data through both online and offline methods. The sample size was designed to include 400-600 participants, distributed proportionally across regions. The detailed sample distribution is shown in Table 1.

Table 1: Distribution of Sample Size

Province	Hefei	Wuhan	Nanjing	Beijing	Shanghai	Shaanxi
Sample size	156	82	97	86	57	98

The distribution of the children’s questionnaire was carried out through two main methods. First, it was shared on social platforms such as WeChat, Weibo, and Zhihu. Parents were

invited to complete the questionnaire and share it with others. The target participants were parents whose children had experience purchasing or were familiar with museum cultural and creative products. Second, with permission from schools and parents, children aged 12-15 from middle schools in Hefei, Anhui Province, and Wuhan, Hubei Province, were invited to fill out the questionnaire during scheduled sessions.

3.2 Questionnaire Design

The children’s questionnaire was designed to be simple and easy to understand, suitable for the cognitive levels of children aged 6-15. For younger children, the questionnaire was distributed to parents, who asked the questions to their children and recorded their responses. For children aged 12-15, the questionnaire was distributed in cooperation with schools, and students completed it independently. The questionnaire consisted of nine items, covering age, gender, museum visitation experience, purchasing experience, and preferences.

3.3 Ethical Statement

This paper adhered strictly to ethical guidelines. Before data collection, detailed explanations were provided to children and their parents, and informed consent was obtained. All data were stored anonymously and used solely for academic research purposes, ensuring confidentiality and protecting participants' privacy.

4. Data Findings and Analysis

The researcher organized the data of the collected research questionnaires about children (6-15 years old), and collected 576 questionnaires, deleted the questionnaires with too long or too short response time, duplicated IP addresses, and the parents did not take their children to the museum. Finally, 516 valid questionnaires were used, with a recovery rate of 89.5%. Among all the questionnaires, 86.43% of the children said their parents had taken them to the museum, and only 13.57% of the children had not been to the museum (such questionnaires had been excluded). The specific distribution is shown in Table 2.

Table 2: Descriptive Statistics on Children's Questionnaire Information

Descriptive Indicators	Type	Frequency	Percentage (%)	Cumulative Percentage (%)
Gender	boy	264	51.16	51.16
	girl	252	48.84	100.00
Age	6-8	161	31.20	31.20
	9-11	138	26.74	26.74
	12-15	218	42.06	100.00
Have you ever been to a museum before?	Yes	446	86.43	86.43
	No	70	13.57	100.00
Have you ever purchased MCCPs?	Yes	396	76.74	76.74
	No	120	23.26	100
Why do you like to visit museums ?	A.learn about the history and culture of the museum	387	75.00	75.00
	B.Animation, technology interaction and digital display are interesting	318	61.63	136.63
	C.School organized visits	296	57.36	194.00
	D.Family activities	242	46.90	240.89

Do you think MCCPs can help children learn?	A. Very helpful	147	28.49	28.49
	B. Helpful	180	34.88	63.37
	C. Average	141	27.33	90.70
	D. Not helpful	31	6.01	96.71
	E. Not helpful at all	17	3.29	100.00
What types of MCCPs do you like to buy?	A. Souvenirs (commemorative coins and badges, keychains and magnets)	335	64.92	64.92
	D. Toys and craft kits (puzzles and models, craft kits)	262	50.78	50.78
	B. Stationery (notebooks and pens, postcards and posters)	230	44.57	44.57
	C. Books and publications (exhibition catalogs, educational books)	212	41.09	41.09
	F. Home goods (mugs and water bottles, decorative items and home décor)	203	39.34	39.34
	G. Interactive games (board games and card games, mobile apps and e-books)	161	31.20	31.20
	E. Apparel and accessories (T-shirts and hats, scarves and bags)	157	30.43	302.33
What is the most interesting part for MCCPs?	A. The product looks good	314	60.85	60.85
	D. The product is very creative and interesting design	253	49.03	109.88
	C. The product allows me to learn about relevant history and culture	225	43.60	153.49
	B. The product is very practical	211	40.89	194.38
	F. The product is reasonably priced	150	29.07	223.45
	E. The product has a sense of technology	136	26.36	249.81
Which purchasing way do you prefer?	A. I prefer to buy them myself	263	50.97	50.97
	B. My parents buy them for me	253	49.03	100.00

Through the above table, in terms of the gender of the respondents, the proportions of boys and girls are relatively close to each other, with boys accounting for 51.16% and girls accounting for 48.84%, which shows that the gender distribution in the sample is relatively balanced, reflecting the balanced nature of the target group.

In terms of the age of the respondents, the age group of 12-15 years old accounted for the highest proportion of 42.06%, the age group of 9-11 years old accounted for 26.74%, and the age group of 6-8 years old accounted for 31.20%. According to the theory of children's cognitive development, 6-11 years is in the stage of concrete operation, and logical thinking is developing; 12-15 years enters into the stage of formal operation, children's abstract thinking and reasoning ability is enhanced, and the degree of participation is relatively high, which shows that the age distribution of the sample is reasonable.

From the results of the respondents' data on "purchasing methods," the choice of purchasing methods of children aged 6-15 is almost in a balanced state, with the proportion of children choosing to "buy by myself" at 50.97% and the proportion of children choosing to "buy from my parents" at 50.97%. The proportion of children choosing "buy by myself" is 50.97%, and

the proportion of children choosing “my parents buy for me” is 49.03%. This result shows that children tend to make their own choices and are also influenced by their families’ purchasing decisions.

Regarding the “visiting experience” of the respondents, 86.43% of the respondents said they had been to museums before, while 13.51% of the children said they had not been there. 76.77% of the children said they had been to museums before, while 76.77% said they had not been there. 76.77% of the children said they had purchased products from the museum store. These data show that many parents actively take their children to visit museums. They want their children to learn more about traditional culture and history. Still, the actual visiting experience is more helpful for them to understand the concept of museums and to gain a deeper understanding of culture and history through sensory contact with concrete objects. At the same time, the data also suggests that the museum store’s products have a high level of attraction and willingness to buy among visitors.

In terms of “willingness to visit,” 75% of the children chose “to learn about the history and culture of the museum,” 61.63% of the children thought that “the animations, technological interactions and digital displays in the museum are interesting,” and 61.63% of the children thought that “the animations, technological interactions and digital displays in the museum are interesting.” 57.36% of the children chose “school visits, like to learn about museum artifacts with classmates,” and 46.90% mentioned “family activities, where you can discuss the artifacts and history with your parents and then share them.” Meanwhile, through the cross-tabulation analysis (Figure 1), we can see that the data on children's preferences for museum activities in different age groups and genders are as follows:

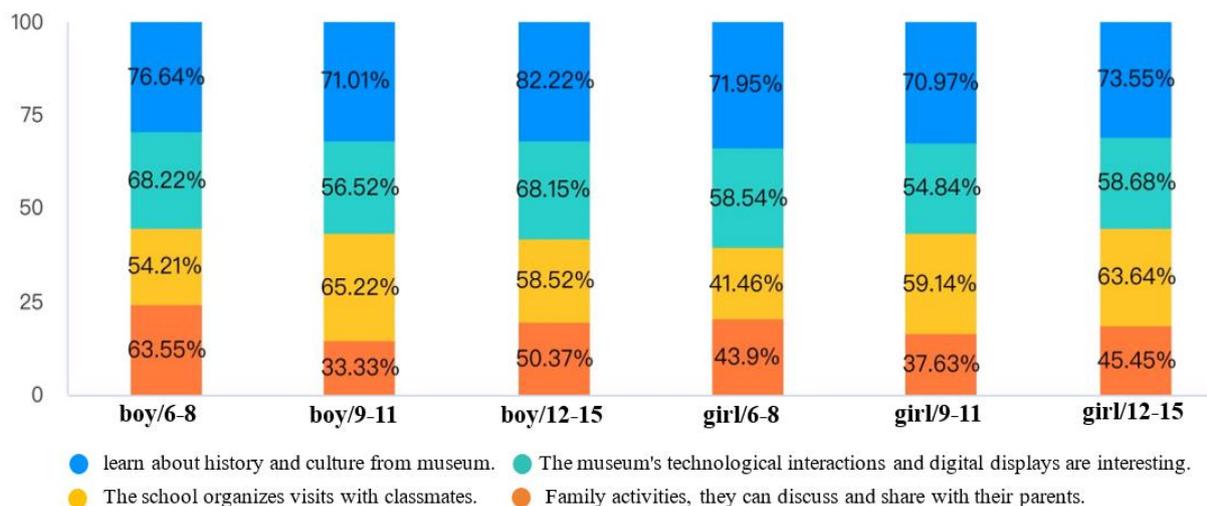


Figure 1: Cross-sectional Analysis of Children's Willingness to Visit Museums by Age and Gender.
 Notes/Source: Designed by Researcher

Combined with the theory of children's cognitive development, the above graphic data shows that 6-8-year-olds prefer visual and dynamic displays due to their early stage of cognitive development in the concrete operations stage, and they prefer “digital displays and interactive technology in museums.” Children aged 9-11 have a higher preference for “school visits,” indicating a preference for socialization and group participation, while children aged 12-15 have a higher preference for “historical and cultural content,” which is consistent with their cognitive stage, as they progressively enter a more advanced stage of cognitive development, where they have a higher preference for “digital displays and interactive technology in

museums.” This is in line with their cognitive stage, where they are moving into abstract thinking and are able to understand complex cultural knowledge in greater depth. Meanwhile, regarding “family activities,” the proportion of children’s interest is generally higher, showing a strong demand for parent-child activities, which indicates the importance of parent-child interaction in the museum experience. However, there are also gender differences in preferences for certain activities; for example, boys have a slightly higher preference for science and technology interactions, while girls are more interested in cultural and historical presentations.

In terms of the respondents’ evaluation of “whether museum cultural and creative products can help children learn new knowledge,” 34.88% of the children think it is “quite helpful,” and 28.29% of the children choose “completely helpful.” The total proportion of these two items is more than 63%. Only 9.22% of the children said “not helpful” and “not helpful at all,” which indicates that the learning value of the product is generally recognized. The 27.33% who said “generally helpful” shows that some children are still neutral about the helpfulness of the product. This suggests that the product’s content, function, and format need to be improved, or the marketing needs to be enhanced.

In terms of respondents’ “preferred types of museum cultural and creative products,” souvenirs were the most popular with 335 selections, followed by toys and craft kits with 262 selections, stationery with 230 selections, books, and publications with 212 selections, houseware with 203 selections, and interactive games with 161 selections; Apparel and Accessories 157 selections. These data show that children’s demand for museum cultural and creative products shows a diversified trend, especially in the souvenir category, which belongs to the most popular product types for children aged 6-15. Meanwhile, cross-analysis (Figure 2) shows that children of different ages and genders significantly differ in their preferences for museum souvenirs.

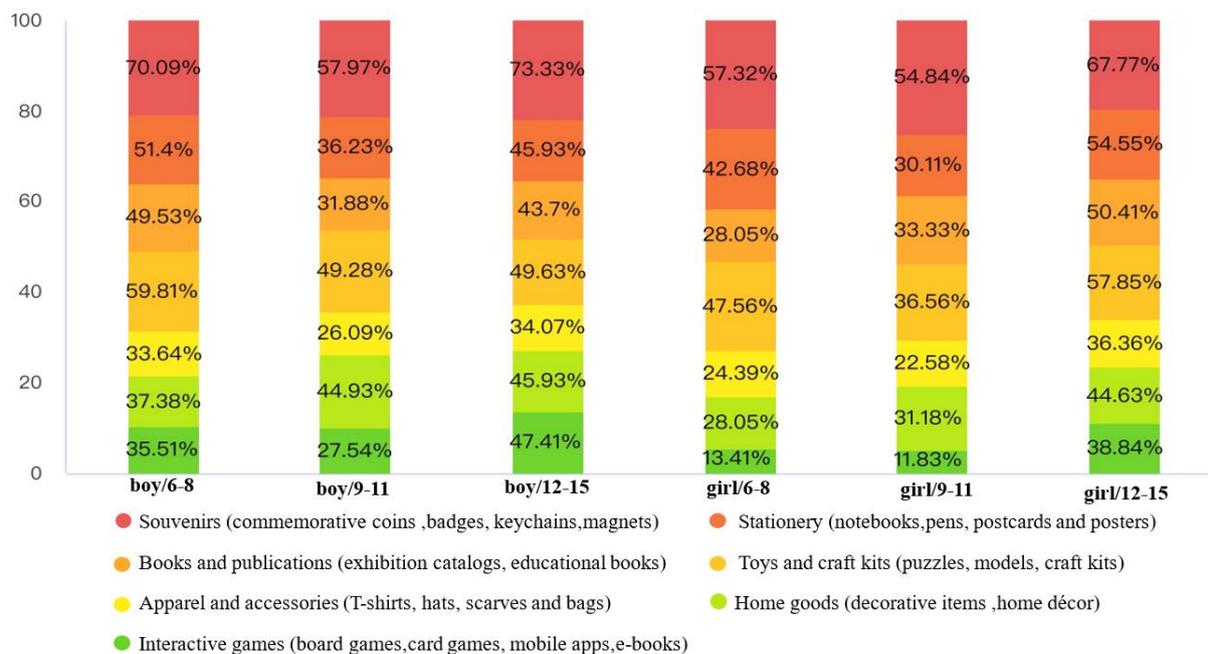


Figure 2: Cross-analysis of the Types of MCCPs by Children of Different Ages and Genders.
 Notes/Source: Designed by Researcher

Children aged 6-8 have limited attention and information processing skills and prefer intuitive and easy-to-understand products, such as “toys and craft kits, ” which satisfy their curiosity

and hands-on skills through simple interactions such as hands-on manipulation and assembly. 9-11-year-olds have high levels of information processing and are already highly capable of understanding logic and rules. Children in the 9-11 age group have strong information processing skills, have a high level of logic and rule comprehension, and show some interest in content products such as “books and publications,” indicating that they can begin to understand and pay attention to things with more complex content. 12-15-year-olds can comprehend abstract concepts and are more interested in items that reflect their personality or identity. “Clothing and accessories” shows a preference in the data, reflecting their need for self-expression (Table 3).

Table 3: Statistical Table of Types Preference among Children of Different Ages and Genders

Age	Gender	Primary Preference	Secondary Preference
6-8 years	boy	Souvenirs (70.09%)	Toys and craft kits (puzzles and models, craft kits) (59.81%)
	girl	Souvenirs (57.32%)	Stationery (42.68%)
9-11 years	boy	Souvenirs (57.97%)	Toys and craft kits (puzzles and models, craft kits) (49.28%)
	girl	Souvenirs (54.84%)	Books and publications (33.33%)
12-15 years	boy	Souvenirs (73.33%)	Apparel and accessories (T-shirts and hats, scarves and bags) (47.41%)
	girl	Souvenirs (67.77%)	Household goods (44.63%)

From the evaluation of “what is the most interesting part of the museum cultural and creative products,” “the products look good” is the most interesting part of the interviewees, with 314 times selected; “the products are creative and interesting” with 253 times selected; “the products can let me understand the related history and culture,” with 225 times selected; “the products are practical” with 211 times selected, showing the importance of practicality. “The product is creative and interesting” was selected 253 times, ‘The product can help me understand the related history and culture,’ 225 times, and ‘The product is practical,’ 211 times, showing the importance of practicality. Comparatively speaking, “the product is reasonably priced” and “the product has a sense of science and technology” have a lower level of concern. Through cross-tabulation analysis (Figure 3), children's product interest preferences were analyzed across different age groups and genders, and the results showed significant differences.

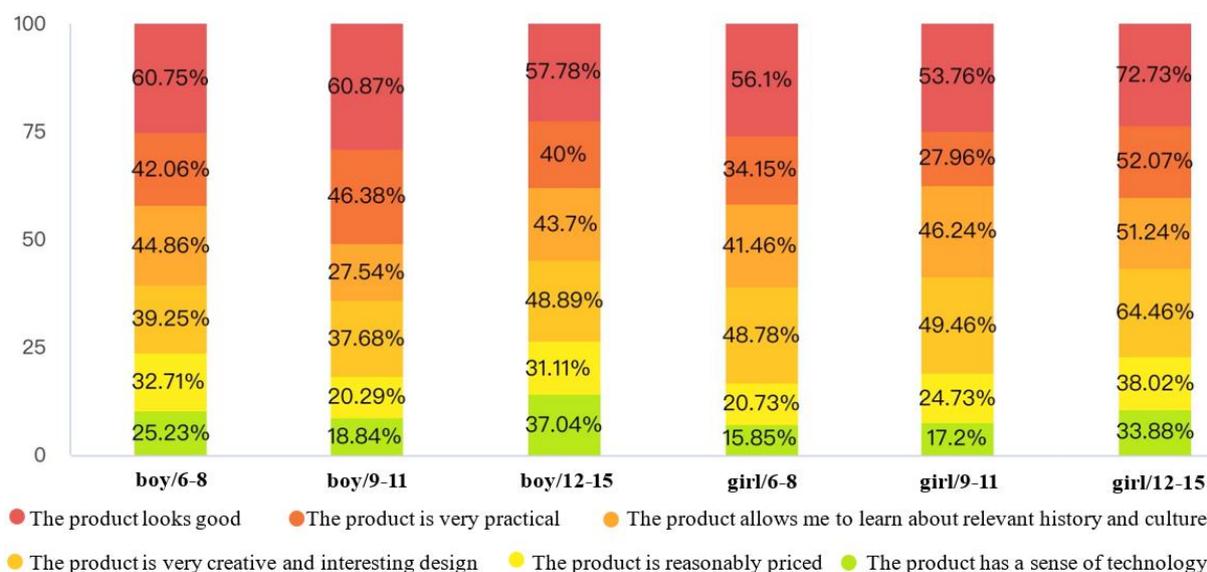


Figure 3: Cross-analysis Chart of Product Interest Preferences of Children of Different Ages and Genders.
 Notes/Source: Designed by Researcher

The cross-tabulation analysis in Figure 3 shows that children of all ages show a strong preference for products that “look good.” 6-8-year-olds are interested in products that are visually appealing and interesting, with boys showing a higher interest in usefulness (42.06%) and history and culture (44.86%), and girls showing a higher interest in fun (48.78%) and utility (34.15%). Interest in fun (48.78%) and usefulness (34.15%) accounted for a higher percentage of interest. 9-11-year-olds were more interested in historical and cultural values, with 46.38% and 46.24% each, and also began to pay attention to the reasonableness of the price. 12-15-year-olds were more interested in knowledge acquisition and self-expression, with boys having a higher preference for interesting products (48.89%) and attention to cultural values (43.7%), while girls also show strong interest in practicality (52.07%) and cultural values (51.24%) (Table 4).

Table 4: Statistical Table of Product Interest Preferences of Children Different Ages and Genders

Age	Their focus	Gender	Primary Interest	Secondary Interest	Additional Interest
6-8	Visually appealing and interesting	boy	Looks Good (60.75%)	Useful (42.06%)	History/Culture (44.86%)
		girl	Looks Good (56.1%)	Interesting (48.78%)	Useful (34.15%)
9-11	Cultural and Educational Value	boy	Looks Good (60.87%)	Historical/Cultural Value (46.38%)	Useful (27.54%)
		girl	Looks Good (53.76%)	Historical/Cultural Value (46.24%)	Reasonable Price (24.73%)
12-15	Knowledge acquisition and self-expression	boy	Looks Good (57.78%)	Interesting (48.89%)	Historical/Cultural Value (43.7%)
		girl	Looks Good (72.73%)	Historical/Cultural Value (51.24%)	Useful (52.07%)

5. Discussion

Objective 1: To identify the needs and preferences of children aged 6-15 for museum cultural and creative products (MCCPs).

According to the research data, the preference and demand for MCCPs among schoolchildren aged 6-15 years old show significant age-stage characteristics and are influenced by changes in their cognitive development level and interests. Children aged 6-8 prefer products with bright colors, intuitive design, and interactivity. They show strong interest in manipulative product offerings that stimulate their curiosity, such as puzzles, cartoonish models of artifacts, and tactile materials. Children in this age group prefer to satisfy their desire to explore through sensory stimulation and hands-on experiences.

Children aged 9-11 show greater interest in intellectual and educational products. They favor products that provide knowledge through problem-solving or exploring historical contexts, such as history-themed puzzle games, DIY kits, and educational books. The needs of children at this stage reflect the transition from sensory experience to knowledge acquisition. Adolescents aged 12-15 are more concerned with cultural depth and personalized expression. They like to display themselves through products with cultural symbols or artistic elements while deepening their understanding of cultural content, such as jewelry with cultural relic motifs, DIY handmade products, and interactive experiences with art-related technology.

Objective 2: To integrate Children's Needs and Preferences into Museum Cultural and Creative Product Design

This study identifies metaphorical characteristics in children's needs and preferences. The terms "metaphor" and "metaphorical design" are used to explore how these needs and preferences can be addressed through metaphorical approaches.

Metaphorical design plays a key role in product creation. It involves observing and understanding connections and similarities between objects, then reprocessing and recreating them. All artifacts stem from certain metaphorical ideas, which are identified and applied based on their resemblance to objects or associations with behaviors. Zhu (2017) analyzed Kenya Hara's redesign exhibition and highlighted metaphor's application in decoration, functionality, and cultural representation, providing innovative directions for daily product design. Tan (2018) explored the concepts of "similarity" and "dissimilarity" in design and outlined steps in cultural product creation. Zhao (2019) studied the metaphorical features of traditional cultural symbols and proposed mechanisms and methods for their application in design. Yu (2020) described cognitive levels in design and introduced a seven-step approach that includes identifying the base, analyzing it, gathering information, and selecting appropriate metaphors. These studies highlight the progress and importance of metaphorical design in product development.

The needs and preferences of children aged 6-15 also exhibit strong metaphorical characteristics. This is influenced by their cognitive development, learning styles, and the complexity of cultural transmission. Understanding abstract cultural and historical information requires visual and concrete forms. For children aged 6-8, metaphorical design can transform abstract knowledge into simple symbols or story-based contexts, fostering their initial cultural understanding. For children aged 9-11, exploratory metaphors deepen knowledge through engaging activities. By integrating cultural content into puzzles, DIY crafts, or interactive games, metaphorical design makes learning more enjoyable and engaging. For adolescents aged 12-15, symbolic metaphors facilitate self-expression and cultural identity. Simplified patterns, motifs, and characters help connect cultural meanings with their cognitive and emotional needs.

Examples of metaphorical design illustrate its application. In the "Paleontology Assembly Kit," dinosaur models attract younger children, helping them learn about dinosaurs' habits and geological contexts during assembly. The Nanjing Museum's "Six Dynasties Adventure Box" includes puzzles and interactive tasks, allowing children to uncover historical clues while exploring the cultural background of the Six Dynasties. The Anhui Museum's "Huizhou Culture DIY Fan Set" enables teenagers to craft fans while learning about Huizhou's traditional architectural symbols, combining cultural understanding with personal creativity. Similarly, the Hubei Provincial Museum's "Starry Sky Puzzle" uses captivating storytelling and interactive designs to teach astronomy as children assemble constellation patterns.

In summary, metaphorical design addresses children's needs at different cognitive stages and promotes the transmission of museum culture. Although children may not explicitly express a demand for educational value, they often absorb cultural knowledge unconsciously through engaging and interactive products. This approach connects culture and learning, enriching both education and cultural experience.

6. Conclusion

Children aged 6-15 years show diversified and hierarchical demands for cultural and creative products. Children aged 6-12 years pay more attention to fun and interactivity, while children aged 12-15 pay more attention to cultural depth and educational significance. The stage of cognitive development significantly influences children's preference for product design, function and cultural connotation. Children not only expect that cultural and creative products can provide an entertainment experience but also want to deeply understand the cultural value and historical background behind museum exhibits through the products.

This study not only provides practical guidance for the design and promotion of cultural and creative products in museums but also offers new perspectives for theoretical research in related fields. Future research can further focus on the impact of inter-regional cultural differences on children's needs and how digital technology can be better integrated into the design of cultural and creative products to more comprehensively meet children's needs and preferences and to promote the comprehensive value of museums in education, cultural dissemination and family interaction.

Future cultural and creative product development needs to focus more on combining children's cognitive development characteristics and providing age-appropriate, diversified, and highly interactive products. The introduction of digital technologies, such as Virtual Reality (VR) and Augmented Reality (AR), can provide more possibilities for designing cultural and creative products and enhance children's immersive experience and learning effects.

7. Limitations

This study has certain limitations. First, due to the limitation of the convenience sampling method, the sample distribution may not fully represent the demand characteristics of children across the country, especially those in remote areas or areas with relatively scarce cultural resources. Second, this study mainly relies on questionnaire survey data and fails to deeply explore children's real behavior and emotional experience when they actually use cultural and creative products, lacking the supplement of experimental research. Third, the questionnaires for young children are mostly completed by their parents, which may affect the expression of children's real preferences to a certain extent. Future research should expand the sample coverage, deeply explore the demand characteristics of children in different situations, and further analyze the effect of integrating technology and cultural and creative products on children's experience.

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