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Playful Public Design by Children

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ABSTRACT

The design of public space and facilities in a country park aims to serve a wide scope of people with diverse needs and interests. Research on human factors should include users of different ages and capabilities. Children are often a forgotten category of users for collecting views in public design. Involving children in the design process helps to optimise outdoor recreational and educational experience in a country park. Playful Public Design by Children was a design research project which involved 1,023 children aged 3 to 18. Using a human factors (or ergonomics) approach, they were guided to identify and solve problems in the real-life setting of Shing Mun Country Park in Hong Kong. The design research was co-led by a design lab of a university and a group of art and design studios for children. Children were engaged in site research and visual-based design projects. This paper reports on a group of children aged 8 to 12. The visual-based design research activities of the project allowed children to observe and evaluate the inadequacies of current park design. Research findings on children's problem-solving strategies and proposed design solutions go beyond existing park design that covers only functional and physical aspects. Children addressed other human factors such as psychological, emotional and social needs of users resulting in an array of whimsical designs. The significance of the research project is the pedagogical practice that reveals children's design ability and potential as contributing citizens. The project changed urban children's perception of nature, design and problem-solving, and also how parents perceiving the value of design education. This paper advocates that, through children's lenses, designers can find a more inclusive view of human factors that can optimise users' interaction with the country park environment.

Keywords: Children participatory design, Creative pedagogy, Inclusive public design, Psychological, Emotional and Social human factors

INTRODUCTION

Public designers have the arduous task of managing multiple design considerations for different users. Children make up a substantial group of public design users but their opinions are seldom examined. Playful Public Design by Children was an inclusive research project that involved 1,023 children who explored design thinking in the real-life setting of Shing Mun Country Park in Hong Kong (Siu et al., 2021) (Figure 1). The research objective is to understand how children use a human factors (or ergonomics) approach to identify and solve problems, such as usability of facilities, walkability of the

Figure 1: On-site research at Shing Mun Country Park, Hong Kong (by authors).

park, conflicts between humans and animals, and the need for more child-friendly recreational facilities. Children were engaged in site research and visual-based design projects to find inspiration from nature and to externalize ideas with hands-on mixed media.

Spanning for over two years, the research project gathered data from observations found in design processes, drawings and models. Children expressed ideas about the country park in an array of playful designs such as signages, structures and spaces. The research findings revealed children's common concerns for security, comfort, hygiene and other fun factors and how they used design as a tool for change.

The two collaborative partners in this research are the Public Design Lab of The Hong Kong Polytechnic University School of Design and CreativeKids, a group of art and design studios in Hong Kong. The collaboration has helped to foster understanding among academics, professionals, educators, researchers, parents and anyone interested in inclusive public design that shapes our shared environment.

CHILDREN AND PUBLIC DESIGN

Definitions

Public Design and children's participation in design are two key focuses of this research. The Convention on the Rights of the Child (United Nation, 1995) defines a child as a human being younger than 18 years old. In this research project, the participants were aged from 3 to 18. For brevity in this article, examples were drawn from the group of children aged 8 to 12. Public space refers to areas in the built and natural environments to which the public has access for gathering, communication and interaction (Altman & Zube, 1989; Hsia, 1994; Siu, 2007; 2015). Design can be an object or a chosen action taken to realize ideas, to meet a need or solve a problem. Public design can be described as the conception and realization of new things *for all* in a space that allows public access to social, cultural, academic or political interactions (Siu et al., 2021).

Children's Participatory Design

Druin (2002) identified four roles in participatory design: user, tester, informant and design partner. The children in this research adopted three roles as researcher, designer and changemaker. Regardless of what role(s) they

took, public design has a close relationship with participatory design, as it is essential to include all in public design so that the outcome meets the needs of all users, children included. Children's intuitiveness and authenticity are valuable in a design process when researchers are genuinely interested in considering the views, ideas and preferences of different categories of age and ability. Participatory design with children is becoming increasingly popular in academia and professional fields. For instance, Roussou, Kavalieratou and Doulgeridis (2007) involved children in the design of an online art education programme for the National Gallery of Art in Athens, Greece. Children participated in the design of inclusive safety signs in densely populated urban areas in Hong Kong (Siu et al., 2015; 2017). Jansson (2015) involved children in reviewing local play space management. Carrol, Witten, Asiasiga and Lin (2019) discussed ways to increase children's participation in urban planning by showcasing the process and outcomes of two participatory projects with children related to Auckland city life and the redevelopment of a city square.

Design Process and Design Thinking

In a design process, children learn to identify problems and explore possible solutions. Among professionals, the most common models of the design process are the two developed by IDEO and Stanford d.school. The five stages of IDEO's design thinking process are discovery, interpretation, ideation, experimentation and evolution (Brown & Katz, 2009). Stanford d.school's five steps of design thinking are empathise, define, ideate, prototype and test (HPI & Stanford d.school, n.d.). Other scholars, researchers and designers have also studied the stages of the design process and found similar iterative outcomes.

Brown (2009) suggested that design thinking be taught to persons who do not know how to design. Children, driven by curiosity and innate creativity and having fewer restrictions and boundaries in thinking, may be particularly receptive to learning design thinking and process. Research studies have been made to investigate children's design thinking skills in makerspaces using apps (Hatzigianni et al., 2021) and to identify indicators of idea fixation when children design (Schut et al., 2020). However, literature related to children's design thinking or design process in the context of public spaces is still limited. How children perform design thinking and work in the process of public design is interesting and worthy of further exploration.

METHODOLOGY

A combination of qualitative and quantitative methods with an emphasis on visual-based research methods was used to provide a more comprehensive understanding of how children relate to public design (Creswell & Clark, 2011). Most of the qualitative inquiries drew textual data from a questionnaire called Teachers' Tool Questionnaire with three sections to describe children's design process: inquiry, ideation and improvisation. The textual data were the design facilitators'/researchers' observation of children's responses

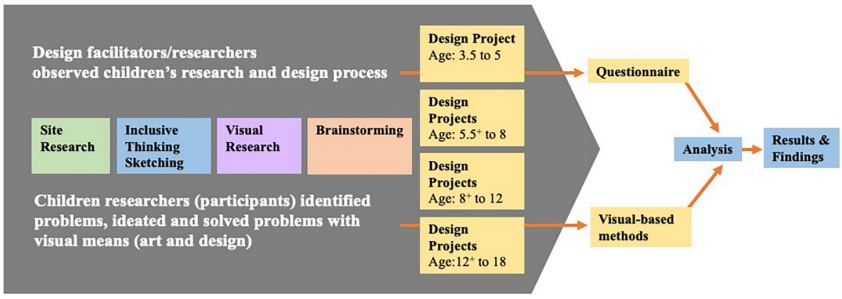

Figure 2: Research design (Siu et al., 2021) (by authors).

and perceptions during the playful design projects. Six pre-determined categories were used to aid data entry: nature (animals and insects), nature (plants and scenery), human, activities, public space/facilities and others. The textual data were identified as codes and themes using reflexive thematic analysis (Braun & Clarke, 2012). The results, represented as quantitative charts, revealed children's concerns, ideas and solutions on different age levels.

Child-friendly visual research methods in the form of worksheets, mind-maps, sketches, mixed media art and design models were used. Visuals helped children to give shape to their ideas or sensory experiences that are indescribable with words. As identified by Literat (2013), images generated or provided by children could be used in both the formative and evaluative stages of research, and its flexibility and versatility have been acknowledged by researchers.

Playful design projects were designed as fun-filled visual-based entry points to help children approach the topics with enthusiasm. Children did not adhere to a prescribed set of 'design processes'. Rather, they responded to the sensory stimulation of the country park and generated ideas during brainstorming and the tinkering process with materials. They were introduced to the mindset of design thinking, characterized by empathy for different users: human, animals and insects.

Research Design

The research process took place in several stages (Figure 2). Starting with on-site research (sensory experience and observation), inclusive thinking sketching (from impression and/or imagination), visual thinking and representing (depicting colours, shapes, lines and textures of the site), brainstorming (group discussion of the needs and problems identified in the site) and a range of playful design projects that engaged children in 2D and/or 3D artmaking and design. As the children observed the needs and problems in the country park, the design facilitators/researchers observed children's concerns, ideas and solutions in their creative actions resulting in a rich body of data.

PLAYFUL DESIGN PROJECTS

The 1,023 children participants from the studios of CreativeKids were divided into four age groups (Table 1). Playful design projects were conducted

Table 1. Research participants age groups and playful design projects.

Group Name	Age	No. of Participants	Playful Design Projects
Preschool	3.5 to 5.5	423	Monkey Signages Design
Junior	5.5^{+} to 8	262	Whirly Facilities, Playful Tools, Butterflies Design
Intermediate	8^{+} to 12	304	Gazebos, Tree Houses & Observation Towers Design
Senior	12^{+} to 18	34	Self-directed Design & Recycling Bins Design
Total		1,023	

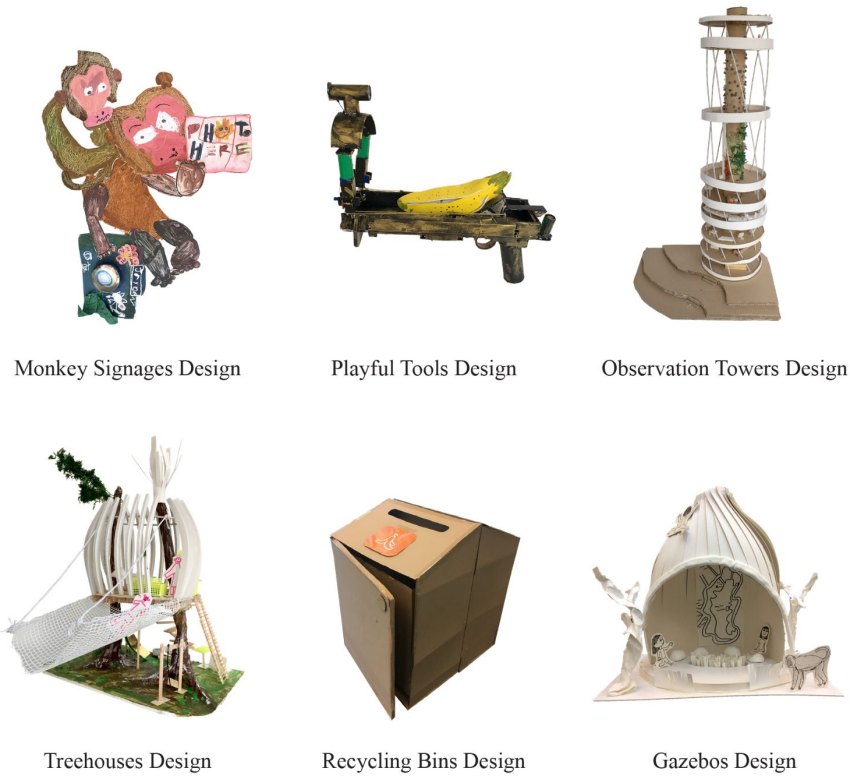

Figure 3: Examples of children's design outcomes inclusive of human factors for optimizing users' interaction with the country park environment (by authors).

by the design facilitators/researchers according to the children's capabilities and interests (Figure 3). Each of the playful design projects involved briefing, brainstorming, ideating through drawing and improvising with a collection of upcycled materials.

ANALYSIS AND DISCUSSION

A close study of children's sketches revealed that children's perception of the country park could be based on two sources: imagination or impression. More children in the younger age group (aged 3 to 8) sketched according to

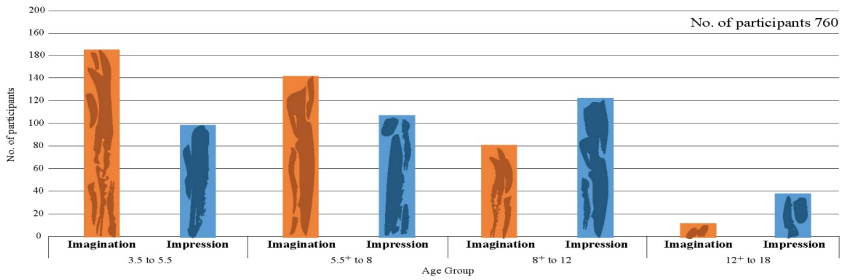

Figure 4: Children's sketches based on imagination or impression (by authors).

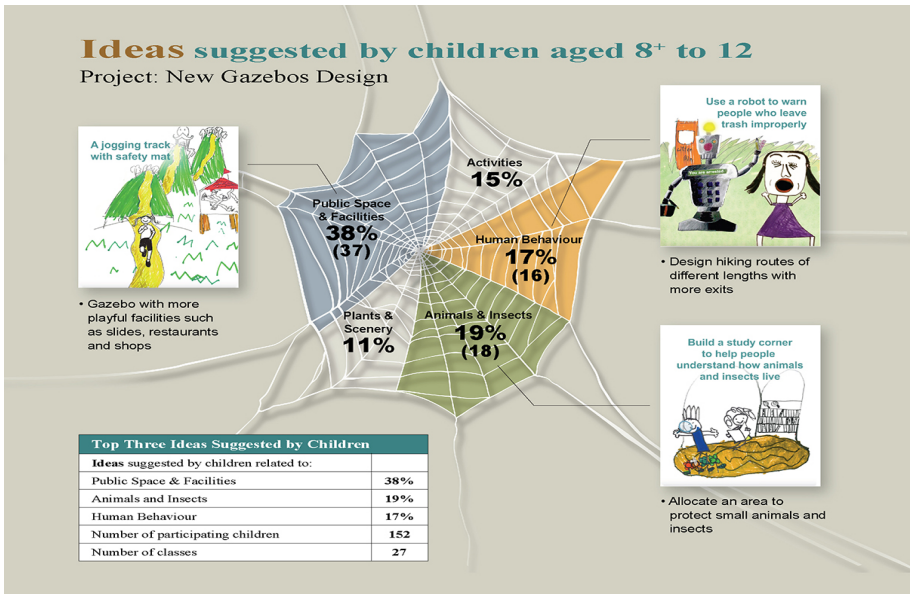

Figure 5: Examples of ideas to improve the country park by children aged 8+ to 12 (Siu et al., 2021) (by authors).

their imagination, whereas the older children (aged 8+ to 18) sketched from their impression (Figure 4). This difference could be interpreted as older children's growing ability to draw ideas from an expanding body of knowledge and life experiences, not merely from imagined ideas or fantasy.

The textual and visual data from the playful design projects were grouped into three broad categories: 'Concerns' expressed, 'Ideas' and 'Solutions' proposed by the children. Different groups of children generated ideas for improving public space and facilities to cater to different users. Figure 5 shows some of the ideas such as a padded jogging track, a robot to warn people leaving trash improperly, an area to protect small animals and insects and a study corner to help people understand animal and insect habitat.

Among the abundant data, eight themes were identified reflecting children's concern for: security, empathy, curiosity, comfort, hygiene, recreation,

Table 2. Themes, subthemes and children's problem-solving strategies.

Themes	Examples of Subthemes	Examples of Problem-solving Strategies (age: 8^{+} to 12)
Security	Animals disturbing human	Segregation: Build a 'monkeys only' paradise with banana vending machines
Empathy	Well-being of animals	Distraction: Make a gym for monkeys to use up their energy and burn fat from junk human food
Curiosity	Need knowledge of nature species	Education: Build an observation gazebo with a frame and nests to attract climbing plants and birds
Comfort	Lack of rest points	Minimization: Design hiking routes of different lengths with more exits
Hygiene	Dirty and smelly toilets	Elimination: Remove squat toilets, install powerful fans to vent out smell and mosquitoes
Recreation	Boring recreational facilities	Incentivization: Install war game areas, a zip-line, stargazing campsites and a treehouse reading spot
Refreshments	Lack of food & drinks facilities	Incentivization: Add more vending machines and a gazebo with a café
Design & Aesthetics	Unattractive public facilities	Remediation: Improve boring designs with zoomorphic designs inspired by animals and insects

refreshments, design and aesthetics (Table 2). To be succinct, examples were drawn from only the group aged 8 to 12 to illustrate children's problem-solving strategies.

CONCLUSION

The wealth of whimsical designs and data from the research offered more tangible clues to understanding children's design capability, views and roles in participatory public design. Children might lack sophisticated verbal or written vocabulary but they made it up with the visual language. Paper prototypes, simple design drawings and models were effective tools for visualizing and communicating ideas. Driven by curiosity and imagination, children could come up with playful and potentially practical ideas that challenged adults' assumptions on what was considered good design. These playful ideas offered fresh perspectives for designers to go beyond functional and physical aspects of public design to address other human factors such as psychological, emotional and social needs of different users. Without pretence or intention to impress, children expressed their honest and critical opinions for more fun, adventure and harmony among different users (animals included) in the shared natural environment.

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