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Patterns and Themes in Designing with Children

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Patterns and Themes in Designing with Children

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ABSTRACT

A host of design approaches have been developed to support involving children in the design of new technologies. Unique approaches tend to be developed to involve new “audiences” of children – of different ages, with different abilities, at different levels of involvement – in the design process. While goals of design approaches tend to be explicitly discussed, there are common themes and repeated patterns which appear in multiple design approaches. This monograph identifies these recurrent themes and patterns within design approaches for working with children as informants, design partners or software designers. These themes and patterns have been sorted into groups of: principles or heuristics, which act as guidelines to designers working with children; decision points where designers working with children will need to make choices; common activity patterns and communication patterns which appear frequently in design approaches for working with children, but are often under-described; and emergent phenomena which design approaches may attempt to invoke. These themes and patterns have been identified through comparison of methods and techniques for designing with children, young children, and

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children with a communication gap caused by disability or cross-cultural work.

This catalogue of themes and patterns will be of use for designers working with children in participatory design and co-design activities. Awareness of these factors will allow designers selecting existing design approaches, or creating their own, to better understand and compare existing design approaches.

Keywords: design; children; design with children; participatory design; co-design.

1

Introduction

User-centred design is an approach to designing technology which focuses on the needs of the user during design activities. When children are the target audience, this means designing for the needs, abilities and expectations children have regarding technology. The key challenge, then, is how to design according to the *actual* needs, abilities and expectations of children, rather than the supposed needs and expectations reported by their adult representatives, such as parents and teachers. Even adults who are supposedly trained to understand how children think would still approach the design situation from an adult perspective, with an adult understanding of “how things are supposed to be”, and with adult goals in mind (Guha *et al.*, 2013).

Participatory design activities require the involvement of children, instead of or in addition to, that of their representatives (Bekker *et al.*, 2003; Druin, 2002; Korte, 2012; Potter *et al.*, 2011; Scaife and Rogers, 1999). Allison Druin and her colleagues, in particular, have been vocal about the importance of involving children in all stages of the design process, to ensure their needs, abilities and expectations are accurately represented and adequately met (Druin, 1999, 2002; Druin *et al.*, 1999; Farber *et al.*, 2002; Guha *et al.*, 2008).

Researchers have been examining how to conduct various activities in the design process with children since the late 1960s (Druin, 2002). Some design and requirements elicitation activities that are used with adults are suitable for use with children, although these often require modification to better suit children's abilities (Bekker *et al.*, 2003; Korte, 2012). A large number of design and requirements elicitation methods have also been developed specifically for use with children (Bekker *et al.*, 2003; Druin, 2002; Druin *et al.*, 1999; Scaife and Rogers, 1999).

It is generally recognised that children have important insights to offer in the design process (Druin, 2002; Scaife and Rogers, 1999); however, the exact level of involvement and the activities that children should be involved in are subject to some debate (Bekker *et al.*, 2003; Druin, 2002; Guha *et al.*, 2008, 2013; Scaife and Rogers, 1999). Children's level of involvement in any given participatory design approach can be mapped to one of five possible roles: user, tester, informant, design partner, and software designer (Druin, 2002; Guha *et al.*, 2013). In each consecutive role, children have more input into and control over the design process. As users, children are the end users, with no input into the design process (Druin, 2002). As testers, children are able to test milestone products. Their interactions and explicit feedback may be used to alter relatively minor aspects of the final product (Druin, 2002). Informants are asked for their input throughout the project, at times when it "is considered to be most valuable" (Guha *et al.*, 2013), but are not actively involved throughout the design process. The informant role covers a wide spectrum of involvement, from children providing direct input to a project (Korte, 2012; Scaife and Rogers, 1999), to children sharing their understanding of topics relevant to the design project's aim (Bekker *et al.*, 2003; Dindler *et al.*, 2005; van Doorn *et al.*, 2013, 2014), to children inspiring adult designers through their actions (Druin, 1999; Druin *et al.*, 1999; Larsen and Hedvall, 2012). Informants' input may reveal new ideas and information, or confirm the decisions already made by the adult design team (Druin, 2002; Scaife and Rogers, 1999). They are still not directly involved in the design process, however; full control of the design remains with adult designers (Scaife and Rogers, 1999). As design partners, children are equal members of the design team, working with adult designers. In this role, children make significant

contributions throughout the entirety of the design process (Druin, 2002), with “continuity of involvement” being identified as an essential difference between informant and design partner (Guha *et al.*, 2013). Children acting as software designers act as either solo designers (Harel, 1991; Harel and Papert, 1990), or work with a team of peers (Kafai *et al.*, 1997) to design software, and have full control over the project (Guha *et al.*, 2013).

1.1 Scope

Across the spectrum of design approaches created and adapted for designing with children, methods, techniques and goals are explicitly discussed. However, many design approaches have aspects in common which are not explicitly discussed. This monograph will identify significant or recurrent themes and patterns that can be identified across methods and techniques developed for designing with children. These themes and patterns will provide useful tools and common language to analyse existing design approaches, and to aid in creating new design approaches.

The design approaches that have been included in this monograph span a variety of age groups and ability levels among children, but focus on design approaches in which children are design partners, software designers or informants. Table 1.1 presents the list of design methods that have been included, as well as the age and abilities of the children involved in the papers presented. The emphasis is on papers which describe work with children, rather than teens; although some flexibility has been applied for papers working with teens as part of larger groups, and for teens with physical disabilities and a communication gap.

This monograph includes design approaches for working with young children and children with communication gaps, whether caused by cultural and linguistic differences or disabilities. These groups of children require extra accommodations to support their involvement in design (Allsop *et al.*, 2011; Druin, 2005; Druin *et al.*, 1999; Farber *et al.*, 2002; Guha *et al.*, 2005), such as the inclusion of adults in more supportive roles (Allsop *et al.*, 2011; Korte, 2018), or modifications to techniques and activities to lessen cognitive load or writing complexity

Table 1.1: Design approaches, the ages of children who have participated in these approaches, and notes on the children's abilities and cultural diversity. No notes have been provided where authors have not specified diversity in their descriptions

Design approach and sources	Age	Notes on children's abilities and diversity
Bluebells (Kelly <i>et al.</i> , 2006)	7–9	
Bonded design (Large and Nettet, 2008)	8–12	
CamQuest (Berggren and Hedler, 2014)	4–5	
Child-only design teams (Kafai <i>et al.</i> , 1997)	10–12	
Children as co-researchers (van Doorn <i>et al.</i> , 2013, 2014)	9–12	
Children in the Centre framework (Kärnä <i>et al.</i> , 2010)	4–10	Children with physical and/or mental disabilities, Autistic children, children with “difficulties in academic and life skills such as concentration and communication” (Kärnä <i>et al.</i> , 2010, p. 218)
Co-design beyond words (Wilson <i>et al.</i> , 2019)	5–8	Minimally verbal Autistic children
Contextual inquiry with young children (Druin, 1999; Druin <i>et al.</i> , 1999)	3–5	

Continued.

1.1. Scope

Table 1.1: Continued

Design approach and sources	Age	Notes on children's abilities and diversity
Cooperative inquiry + cooperative inquiry with young children (Druin, 1999; Farber <i>et al.</i> , 2002; Guha <i>et al.</i> , 2013)	4–14; most often 7–11 for cooperative inquiry; 4–6 for cooperative inquiry with young children	
Creative design and evaluation with Nepali children (Antle, 2017; Antle and Bevans, 2012)	8–12	Nepali children working with Canadian researchers
Designing with children with severe motor impairments (Hornof, 2008, 2009)	17	Teens with severe cerebral palsy, non-verbal, limited use of hands and legs, “do not read” (Hornof, 2009, p. 2178)
Embodied narratives (Giaccardi <i>et al.</i> , 2012)	10–11	
Fantasy narration workshops (Duh and Chen, 2010)	13	
Fictional inquiry: Mission from Mars (Dindler <i>et al.</i> , 2005)	10–11	
The Hanen therapeutic approach (Abdullah and Brereton, 2012)	Age not specified	Autistic child
Informant design (Scaife and Rogers, 1999; Scaife <i>et al.</i> , 1997)	7–11	

Continued.

Table 1.1: Continued

Design approach and sources	Age	Notes on children's abilities and diversity
Instructional software design project – solo child software designers (Harel, 1991; Harel and Papert, 1990)	9–10	
Interviewing children in the home setting (Coad <i>et al.</i> , 2015)	Ages not specified	Includes hospitalised children
KidReporter (Bekker <i>et al.</i> , 2003)	9–10	
KidsTeam libraries	7–11	Ethnically diverse
MESS (mad evaluation sessions with schoolchildren) days (Read, 2011, 2015; Read <i>et al.</i> , 2006) and school-based design and evaluation (Read, 2015)	3–16	
Online survey for gathering children's preferences (Allsop <i>et al.</i> , 2010, 2011)	4–12	Typically developing children, children with cerebral palsy, signing Deaf children, children with global development delay, and children with down's syndrome
Participatory design with rural school children in underdeveloped regions (Kam <i>et al.</i> , 2006)	10–16	Indian children from rural, underdeveloped region working with local Indian, and USA-based “ethnic Chinese” and “Non-Resident Indian” researchers (Kam <i>et al.</i> , 2006, p. 25)

Continued.

Table 1.1: Continued

Design approach and sources	Age	Notes on children's abilities and diversity
Requirements elicitation prototyping with Deaf children (Korte, 2012; Korte <i>et al.</i> , 2015; Potter <i>et al.</i> , 2014)	7	Culturally Deaf children
SID (Sensuousness, Interaction and Participation) for Snoezelen (Larsen and Hedvall, 2012)	6–16	Disabled children with a communication gap
Sparkles of brilliance (Hamidi <i>et al.</i> , 2014)	5–13	Cultural and linguistic gap between children and adult designers
Urban co-design (Walsh, 2018)	School aged	Urban children; emphasis on recruiting children of colour and children from low socio-economic areas
Web design day project (Read <i>et al.</i> , 2002)	8–10	
YoungDeafDesign (Korte, 2017, 2018; Korte <i>et al.</i> , 2017b)	3–5	Culturally Deaf, early language acquisition

(Farber *et al.*, 2002; Guha *et al.*, 2004, 2013). A number of methods and techniques have been specifically developed or altered to support them. The themes and patterns found in these approaches often elucidate elements taken for granted in design approaches for working with older children or children without communication gaps; for example, the communication pattern of *discussion and conversation* features heavily in design approaches, but is rarely explicitly discussed unless children's needs and abilities draw attention to it.

This monograph will not provide detailed summaries of methods or techniques for designing with children. Previous work by Fails *et al.* (2013) provides discussions of several of the design approaches on which this paper draws. Summary tables of themes and patterns in each design approach reviewed will be provided in the online appendix.

1.2 Terminology

This monograph will follow the definitions of *method* and *technique* set out by Walsh *et al.* (2013): Techniques are particular activities intended to meet some goal of a method or aim of a design project (Walsh *et al.*, 2013). Methods are collections of one or more techniques, bound together by the ideals and philosophy of a design team (Walsh *et al.*, 2013). Within this monograph, the term “approaches” will be used to refer to methods and techniques as a whole; as, for the purposes of identifying common patterns and themes, both methods and techniques have been examined. The word “pattern” will be used to describe elements which recur across design approaches, and which may have variations, but on which there is limited disagreement in the literature. *Brainstorming* is an example of a pattern – there may be discussion and variation about how to undertake it (e.g. Guha *et al.*, 2013 and Large and Nettet, 2008 both desire greater structure around the act of brainstorming), but the author has not encountered any claims in the literature on designing with children that brainstorming is not of use. “Themes” will refer to elements which recur across design approaches, but which may be the subject of some debate. For example, the goal *equality between adults and children*, spelled out as a goal by Druin and colleagues (Druin, 2002; Guha *et al.*, 2013) but disputed by authors

such as Large, Nessel, Scaife and Rogers (Large and Nessel, 2008; Scaife and Rogers, 1999), can be considered a theme which is returned to for discussions.

In undertaking design projects, designers and researchers select methods and techniques according to the method or technique's goals and the design project's aims. I will use the term *goal* to relate to the outputs or ideals of design methods. For example, the most broadly seen goal in design methods is that the method should *provide useful design information*, which addresses the output of the design method. Another example is the goal *respect for the expertise of all participants*, which addresses an ideal of the design methods to which it applies. These goals, and others seen in design methods for designing with children, will be discussed in Section 2: The Goals of Design Methods. A design team selecting a method or technique will have particular aims for their use, related to the design project they are undertaking; such as designing a digital library (Druin, 2005), identifying children's interests and experiences (Bekker *et al.*, 2003; Dindler *et al.*, 2005), or gathering children's feedback on a prototype (Korte, 2012; Scaife and Rogers, 1999). I will use the word "aim" for these, to distinguish project or activity aims from method goals.¹

The major contribution of this monograph is to set out the common themes and patterns found in approaches to designing with children. To aid discussion and comprehension, these themes and patterns have been grouped into six categories, based on the strength of their use in the literature:

1. *goals* which establish what a design approach does (Section 2);
2. *principles and heuristics*, the rules or truisms of design approaches (Section 3);
3. *decision points*, important aspects of design projects about which designers must make decisions (Section 4);

¹It is worth noting that the "components or goals" (Fails *et al.*, 2013, p. 96) of the design process, as described by Fails *et al.* in their paper *Methods and techniques for involving children in the design of new technology for children*, are equivalent to my use of the word aim.

4. *activity patterns*, overarching patterns or themes which connect activities seen in multiple design approaches (Section 5);
5. *communication patterns*, which specifically address the ways communication is encouraged, supported and used within design approaches (Section 6); and
6. *emergent phenomena*, which design approaches may attempt to invoke, or which may arise more or less naturally, but which cannot be guaranteed through planning (Section 7).

Table 1.2 provides a hierarchy of the patterns and themes within these groupings.

1.3 Identity-First Language vs Person-First Language

This monograph will use the identity-first language terms “Deaf people”, “Autistic people”, and “disabled people” rather than person-first language (e.g. “people with ASD”) out of respect for the preferences of members of the Australian Deaf community and Autistic self-advocates of the author’s acquaintance; and to acknowledge that disability is a function of society, not of an individual (i.e. an individual is disabled by society, not their physical or mental state).

For other groups, this monograph will follow the convention used in the reference papers (e.g. “children with cerebral palsy”).

Where quotes are included, the original authors’ preferred terminology will be maintained.

1.3. Identity-First Language vs Person-First Language

Table 1.2: Hierarchy of patterns and themes

Goals	Principles and heuristics	Decision points	Activity patterns	Communication patterns	Emergent phenomena
Equality between adults and children	Support and be guided by children's autonomy	How much time? What size design team?	Icebreakers and transitional activities	Discussion and conversation	Social experiences
Respect for the expertise of all participants	Flexibility	What physical resources?	Training children to facilitate involvement	Communicating design session aims	Spontaneous games
Acceptance of ideas as worthy of consideration	Keep up momentum	• Low-tech resources	Teamwork	• Sensitisation or contextualisation	Peer tutoring
Collaboration or elaboration	Continuity of design sessions	• High-tech resources	Children conducting design and research	• Implicit tasks	Children's ownership of product or project
Building relationships and trust	Appropriate adult design team roles	Where to design?	Children as experts and teachers	• Problem demonstration and possibility	• Children's ownership of design artefacts
Motivating and stimulating for children	• Specialised adult assistants		research activities	demonstration	• Children's ownership of design sessions or activities
	• Older children as intermediaries		Children as experts and teachers	Presentations	Moderating distractions
	Keep the situation natural		Fantasy activities	Questioning in the now	
			Exploration	Facilitating communication	
			Brainstorming	Novelty and surprise	

Continued.

Table 1.2: Continued

Goals	Principles and heuristics	Decision points	Activity patterns	Communication patterns	Emergent phenomena
Adequate support for children's abilities and communication level	Tailor activities to children's abilities Be aware of non-verbal communication		Prototype creation <ul style="list-style-type: none"> • Low-tech prototyping • High-tech prototyping 		
Diverse data sources	Designers familiarising themselves with children's culture		Reflection		
Providing useful design information			Designer journals		
Maximising children's involvement			Iterative development Critiquing or evaluating <ul style="list-style-type: none"> • Prototype critiquing 		
			Homework and probes		

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