Talking through Designs: Engaging Children in the Design of Healthcare Technology

Dr Raymond Holt
Institute of Engineering Systems and Design
University of Leeds
R.J.Holt@leeds.ac.uk
Contents

• Context: Institute of Engineering Systems and Design

• Why Engage Children in Designing Healthcare Technology?

• Considerations:
  • Methodological
  • Practical

• The Design-Led Interview
Contents

• Context: Institute of Engineering Systems and Design

• Why Engage Children in Designing Healthcare Technology?

• Considerations:
  • Methodological
  • Practical

• The Design-Led Interview
Talking through Designs

iESD Research Areas

Social Sustainability
Sustainable Systems
Energy Efficient Vehicles

Advanced Mechatronics
Assistive Devices
Rehabilitation Robotics

Design Science

Knowledge Management
Decision Support
Soft Metrology
User-Centred Design
Talking through Designs

My Research Focus

iESD

- Sustainable Systems
- Advanced Mechatronics
- Rehabilitation Robotics
- Assistive Devices
- Social Sustainability
- Energy Efficient Vehicles
- Knowledge Management
- Decision Support
- Design Science
- Soft Metrology
- User-Centred Design
My Research Projects

- Social Sustainability
- SEEDS: Digital Inclusion
- White Rose Consortium: Object Handling in the Kitchen
- iPAM: Stroke Rehab
- Active Gaming: CP Rehab
- Assistive Devices
- Rehabilitation Robotics
- Soft Metrology
- User-Centred Design
Active Gaming for Children
Active Gaming for Children

• **G006**: NIHR-funded feasibility study looking at use of home rehabilitation
  • Trying to make reach/retrieve exercise fun.
Active Gaming for Children

• **K005**: NIHR-funded feasibility study looking at collaborative play
• Targetting a school environment.
• Uses collaboration and competition as a motivator.
Active Gaming for Children

- This has meant working with a range of stakeholders, to ensure that the System is:
  - Therapeutically appropriate
  - Feasible for intended environment
    - Usable
    - Enjoyable
  - Socially acceptable
Contents

• Context: Institute of Engineering Systems and Design

• Why Engage Children in Designing Healthcare Technology?

• Considerations:
  • Methodological
  • Practical

• The Design-Led Interview
Talking through Designs

Why Engage Children in Research?

“Never work with children or animals”

W.C. Fields

• Historically, children have been positioned as vulnerable, passive and not competent to fend for themselves. But this is changing…

• Ethical Drivers: Trend towards user involvement: active participants, not passive subjects, giving the user a voice.

• Practical Drivers: Proxy data often inaccurate (they’re not just “small adults”), children are competent to participate in research.
Why Engage Children in Research?

“Never work with children or animals”

W.C. Fields

• Historically, children have been positioned as vulnerable, passive and not competent to fend for themselves. But this is changing…

• **Ethical Drivers:** Trend towards user involvement: active participants, not passive subjects, giving the user a voice.

• **Practical Drivers:** Proxy data often inaccurate (they’re not just “small adults”), children are competent to participate in research.

• **BUT:** children are not just “small adults”!
Why Engage Children in Research?

Not just “small adults”

Drivers to engage

Drivers against engaging

- Shorter attention spans;
- Smaller vocabulary;
- Difficulty with abstract concepts
- Difficulty with formal reasoning
- Traditional power relationship with adults.
- Legal and ethical considerations

Giving Children A Voice

Tension

Sensitivity: age-appropriate methods
Talking through Designs

Why Engage Children in Designing HCT?

• For Active Gaming Systems:
  • Therapeutically appropriate
  • Feasible for intended environment
  • Usable
  • Enjoyable
  • Acceptable
Talking through Designs

Why Engage Children in Designing HCT?

• For Active Gaming Systems:

  • Therapeutically appropriate
  • Feasible for intended environment
  • Usable
  • Enjoyable
  • Acceptable

Teachers

Parents

Physiotherapists

Children
Why Engage Children in Designing HCT?

• For Active Gaming Systems:
  • Therapeutically appropriate
  • Feasible for intended environment
• Usable
• Enjoyable
• Acceptable

Teachers

Parents

Physiotherapists

Children
Why Engage Children in Designing HCT?

• For Active Gaming Systems:
  • Therapeutically appropriate
  • Feasible for intended environment
  • Usable
  • Enjoyable
  • Acceptable
Contents

• Context: Institute of Engineering Systems and Design

• Why Engage Children in Designing Healthcare Technology?

• Considerations:
  • Methodological
  • Practical

• The Design-Led Interview
Considerations when Engaging Children

Important: Children are individuals, not homogenous!

They vary in many ways:

- Gender
- Age
- Rate of Development
- Impairments
- Individual tastes, competencies and experience
- Social, economic and cultural background

These effect both representativeness of their views and the considerations to be made when engaging them in research.
Considerations when Engaging Children

Piaget’s Stages of Child Development:

- **Sensorimotor** (0 to 2 years): Learn how to experience and manipulate the world around them.

- **Preoperational** (2 to 7 years): Use of language and symbols to represent objects. Classification of objects by single feature.

- **Concrete Operational** (7 to 11 years): Able to use logic, and consider others’ viewpoints. Classify objects by multiple features.

- **Formal Operational** (11 years +): Able to use abstract reasoning, able to consider hypothetical or ideological situations.
Considerations when Engaging Children

• Children’s traditional power relationship with adults is particularly problematic.

• Children are used to questions being a way of evaluating them, rather than getting their opinion about something else.

• Prone to response and acquiescence biases:
  • Tend to answer “yes” to yes/no questions
  • Will try to answer questions, even if they don’t know the answer or don’t understand.
  • Reluctant to criticise – everything is brilliant!
  • Older children are very socially aware: will try to infer what you want them to answer.
Contents

• Context: Institute of Engineering Systems and Design

• Why Engage Children in Designing Healthcare Technology?

• Considerations:
  • Methodological
  • Practical

• The Design-Led Interview
Methodological Considerations

• Human-Computer Interaction leads the field in engaging children in Design, with a whole branch of HCI research dedicated to Child-Computer Interaction:

• Significant effort has gone into exploring effectiveness of conventional HCI methods with children:


• Issues of designing with children who have disabilities is only now receiving attention¹.

Methodological Considerations

Levels of User Involvement: How Involved? And When?

Alderson and Montgomery²

low level of participation

Druin³

high level of participation


Methodological Considerations

Levels of User Involvement: How Involved? And When?

Alderson and Montgomery
- Being Informed
- Expressing a View
- Influencing a Decision
- Being the Main Dealer

Druin
- User
- Tester
- Informant
- Design Partner

Active Gaming System
- Acceptability
- Usability
- Enjoyment
## Methodological Considerations

### Who to involve?

| User Group | Small group of children with upper limb hemiplegia due to cerebral palsy.  
Long term relationship – participated over a period of years  
Parental involvement – input to research strategy.  
Represented target user. |
|---|---|
| Schools | Large numbers of children representing peers without upper limb hemiplegia.  
Provide wider perspective on acceptability and enjoyment.  
Short term relationship – returned to schools year after year, but ran sessions with different classes. |
# Methodological Considerations

**Who to involve?**

| User Group | Representative of actual users.  
Difficult to recruit diverse group.  
Limited availability. |
|------------|----------------------------------------------------------------|
| Schools    | Less representative of actual users.  
Easier to recruit diverse group.  
Challenges in working with schools. |
Methodological Considerations

Usability – Talk Aloud

• Conventional approach is use of Talk-Aloud protocols to identify errors.

• However, children struggle with the cognitive load of talking and exploring a system, and tend to lapse into silence.

• Peer Tutoring\(^4\) provides an alternative, where children teach each other to use the system, which encourages them to talk to each other.

Methodological Considerations

Enjoyment – Visual Rating Scale

Use of Smileyometer\(^5\) to rate games and system:

- Awful
- Not Very Good
- Good
- Really Good
- Brilliant

Difficulty with positive response bias: responses ranged from Good – Brilliant.

Forced-Choice or ranking methods better for comparative evaluation.


Methodological Considerations

Acceptability: Interviews

Use of interviews to explore the kind of technology children like, associations with medical technology.

With careful design, children are perfectly capable of participating in conventional one-to-one interviews.

Tried various methods to break up the traditional power-relationship:
  - Focus Groups
  - Board Game
  - Design-Led Interviews – Research by Design

Methodological Considerations

Use of props helpful as a way of providing prompts for discussion – asking children to provide prompts is even better.

Strong anchoring bias: tendency to use any props you brought in as a direct reference.

Need to keep it in terms children are familiar with: avoid jargon.

Importance of using open questions: closed questions tended to result in closed answers, or enumerated lists.

Disruptive behaviour a problem in group methods – especially board game!
Methodological Considerations

Literalism: Ask a Stupid Question… Get a Stupid Answer

**Facilitator:** “What would be a bad material to use for a joystick in your bedroom?”

A: “Meat!”
B: “Cheese!”
C: “Wool!”

**Facilitator:** “Seriously now.”
A: “Metal. Because if it was sunny it might get hot and start a fire…”
Contents

• Context: Institute of Engineering Systems and Design

• Why Engage Children in Designing Healthcare Technology?

• Considerations:
  • Methodological
  • Practical

• The Design-Led Interview

Schools

User Group
Practical Considerations - Schools

• Getting access to schools is challenging: they can be over researched!

• BUT – they are generally enthusiastic if they can see the benefit of the research.

• Need to be sensitive to demands on their time – make sure you give something back:
  o Money to cover costs of extra teaching
  o Training
  o Organising class activities

• Best to develop long term relationships – keep them in the loop!
Practical Considerations - Schools

- Need to fit in with the School day, and around other teaching commitments;

- **Consent** from parents/guardians, **assent** from children

- Important to get whole class involved:
  - Children with disabilities don’t feel singled out;
  - Children whose parents have not consented don’t feel left out.

- Proving a class activity aligned with the national curriculum means teachers are freed up, rather than giving extra burden;

- Be prepared to work in the space you get - classrooms are noisy environments!
Contents

• Context: Institute of Engineering Systems and Design

• Why Engage Children in Designing Healthcare Technology?

• Considerations:
  • Methodological
  • Practical

• The Design-Led Interview
The Design-Led Interview

Uses children’s designs and drawings as basis for interviewing.

Gives child an opportunity to set the agenda, before responding to questions.

Designing, drawing, describing are activities that children are familiar and comfortable with – often more than adults!

Issues of accessibility – but doesn’t need to be a visual design, could be a written description.

Requires you to think on your feet!
Design-Led Interview

Design can be a mode of enquiry:

Frayling⁷:

Research into Design
Research for Design
Research by Design

Working with users to conceive and evaluate designs can help understand their needs, even if the designs themselves aren’t used.

Children’s designs tended to be quite extreme, and generally rated less well than more conservative designs that closely resembled the original joystick.

More interesting insights come from asking *why* particular features were important.
Talking through Designs

The Design-Led Interview Process

Introduction to the Project

Whole Class Design Activity:

Children attend one-to-one interview to tell about their design

Thank You and Wrap-Up
Give it a go!

Draw a picture of how you came to the workshop today.

Add three things that would make the journey better.

They don’t need to be realistic: be as fantastic as you like.

Quality of drawing not important – feel free to annotate, or write longhand.
Talking through Designs

Design – Led Interviews
Give it a go!

Now, break down into pairs: threes at the most.

Take turns to be interviewer.

Aim of interview: to find out people’s travel requirements and preferences.

Interviewer: ask interviewee to talk you through their drawing.

Once they’ve described their drawing and improvements, ask questions:

- Why did they travel this way?
- For the features they describe – why is this important?
Talking through Designs

Where next?

Together in Play:

Facilitating Meaningful Play for Disabled Children through Participatory Design.

Funded through the Leverhulme Foundation

Runs January 2011-December 2013

Working with disabled children and their friendship groups to explore their experience of inclusive play, and identifying barriers

Combines sociology and engineering.
Contents

• Context: Institute of Engineering Systems and Design

• Why Engage Children in Designing Healthcare Technology?

• Considerations:
  • Methodological
  • Practical

• The Design-Led Interview
Talking through Designs: Engaging Children in the Design of Healthcare Technology

Dr Raymond Holt
Institute of Engineering Systems and Design
University of Leeds
R.J.Holt@leeds.ac.uk