Evaluating children’s interactive products
User Centered Design

- When we design things, we design them for people.
- We should be aware of how people will use and feel about the objects, or programs we design.
- If we design something for children we have to make sure that they can use it easily, effectively and with satisfaction.
- Children should be involved in the design process.
Children are different

Do you want to help me count how many scales we still have to find?
Levels of involvement in the design process

Druin’s onion model of involving children in design

Cooperative inquiry: children help in all stages. Practically very difficult
Evaluation

- Children as users -> Evaluation done by experts
- Children as testers -> Evaluation done with children
Formative: during implementation

Inspection: without users

Summative: after implementation

Testing: with users
Classifications of usability evaluation methods

- Summative methods: Examine and summarize the effects or outcomes of a user interface
- Formative methods: Strengthen or improve the user interface
- Inspection methods: Involve only experts, can be seen as a prediction.
Formative Usability Evaluation Methods

- Give lists of usability problems with suggestions for design fixes
- Are mainly qualitative
- Are used to improve a product
- Are typically applied during all design stages, before the product is shipped
- Can also be used to find flaws in competitors’ products in order to create something better
- Do not always involve users
Summative Usability Evaluation
Methods

- Give numbers for efficiency, effectiveness, and satisfaction
- Are mainly quantitative
- Are used to compare solutions or to show that a product meets requirements
- Are typically applied at the end of a project, or when different ideas have to be compared
- Most often involve users, but not necessarily so.
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Inspection methods (Formative)

Inspection methods are applicable early in the design life cycle

• They can be used with paper design, prototype or full system
• They are based on simple methodologies
• They are not expensive
• Evaluators should not be a member of design team (for best results, 3-8 evaluators required)
• Usually several evaluators work independently, then debrief together later.
• Are also considered ‘discount’ methods
Heuristic evaluation

- Inspectors evaluate the interface based on a set of interface design guidelines.
- For children’s products there is less established theory on interface design.
- Inspectors need to have insight into how children behave in particular circumstances.
- Not easy without extensive experience in working with children.
Heuristic evaluation

- MacFarlane & Pasiali proposed to let children use the heuristics in an adapted form.
- Both the heuristics about usability from Nielsen and the heuristics about fun from Malone & Lepper were used.
How many inspectors?

![Graph showing the proportion of usability problems found by different numbers of evaluators. The graph illustrates that with 75% evaluators, 75% of the problems are found, and with 35% evaluators, 25% of the problems are found.](https://www.useit.com)
Heuristics for children’s E-learning

- Created by Alsumait & Al-Osaimi
  - Nielsen’s Heuristics
  - Child Heuristics
  - E-learning Heuristics
What has to be considered for children?

- The general usability of child e-learning programs is a very important aspect, as children do not want to struggle with an application.

- It should also take into account the mental and physical ability of the child.
  - The user interface of the application should be very natural and intuitive to be used for example by 6 to 10 year old children.

- Also take into account the pedagogical effectiveness.

(Alsumait et al 2009)
Types of heuristics

- Nielsens 10 Usability Heuristics for User Interface Design
- Child Usability heuristics
- E-learning heuristics

(Nielsen 1994)
CUH_1. Design Attractive Screen layout

- The screen layout is efficient and visually pleasing.
- The font choice, colors and sizes are consistent with good child screen design.
- The screen design appears simple.

(Alsumait et al 2009)
CUH_2. Use Appropriate Hardware Devices

- Input/output devices are used for their own purposes and are suitable for the specific age group of the child.
- Potential e-learner children have all the necessary computer skills to use the application. There should be a consistency between the motor effort and skills required by the hardware and the developmental stage of the child.
- All input devices/buttons that have no functionality are disabled to prevent user input errors.

(Alsumait et al 2009)
CUH_3. Challenge the Child

- The child should have enough information to start using the program when it is turned on.
- The e-learning program's goals are clearly identifiable.
- The e-learning program is easy to learn, but hard to master. The application is paced to apply pressure but not frustrate the child. The difficulty level varies so that the child has greater challenges as he develops mastery.

*(Alsumait et al 2009)*
CUH_3. Challenge the Child

- The child’s fatigue is minimized by varying activities and difficulties during learning sessions. Challenges are positive learning experiences, rather than negative experiences; resulting in the child wanting to learn more, rather than quitting.
- The program is enjoyable to replay.
- The program gives rewards that engage the child more deeply in the application by moving the child to a higher level.
- The child gets involved quickly and easily with the lessons and/or progressive or adjustable difficulty levels

(Alsumait et al 2009)
CUH_4. Evoke Child Mental Imagery

- The e-learning program allows the child to use his imagination, which enhances comprehension.

- The e-learning program appeals to the imagination and encourages recognition to create a child’s unique interpretations of the characters or contexts.

- The child is interested in the e-learning program characters because (1) they are like the child; (2) they are interesting to him, (3) they are drawn from the child’s own culture.

(Alsumait et al 2009)
The program supports the child’s cognitive curiosity through surprises, paradoxes, humor, and dealing with topics that already interest the child.

Learning information is provided in layers or on different levels, in contrast to the linear approach more common to e-learning.

However, a maximum of two layers or levels must not be exceeded.

(Alsumait et al 2009)
EUH_1. Learning Content Design

- The vocabulary and terminology used are appropriate for the learners.
- Abstract concepts (principles, formulas, rules, etc.) are illustrated with concrete, specific examples.
- The organization of the content pieces and learning objects is suitable to achieve the primary goals of the e-learning program.
- Similar learning objects are organized in a similar style.
- The learning curve is shortened by following the trends set by the e-learning industry to meet the child’s expectations.
EUH_2. Assessment

- The e-learning program includes self-assessments that advances child achievement.
- The e-learning program provides sufficient feedback (audio, video) to the child to provide corrective directions.
- The e-learning program provides the instructor with child evaluation and tracking reports.
EUH_3. Motivation to Learn

- The e-learning program incorporates novel characteristics.
- The e-learning program stimulates further inquiry in different ways.
- The e-learning program uses e-stories, games, simulations, role playing, activities, and case studies to gain the attention and maintain the motivation of learners.
- The e-learning program is enjoyable and interesting.
- The application provides the learner with frequent and varied learning activities that increase learning success.
- The child’s actions are rewarded by audio, video, text, or animations and the rewards are meaningful.
EUH_4. Interactivity

- The child becomes engaged with the e-learning program through activities that challenge the child.
- The child should be able to respond to the program at his leisure. The program, on the other hand, needs to respond immediately to the child.
- The child has confidence that the e-learning program is interacting and operating the way it was designed to interact and operate.
EUH_5. Accessibility

- The e-learning program may be used on a variety of equipment and platforms such as laptops, PDA etc.
SEEM

- Similar to Cognitive Walkthrough
- SEEM: Structured Expert Evaluation Method
- The Structured Expert Evaluation Method consists of a checklist with questions, originally based on Norman’s theory of action model (Norman 1998) and on Malone’s concepts of fun (Malone 1980).
SEEM’s Questions

1. Goal
   - Can children perceive and understand the goal?
   - Do children think the goal is fun?

2. Planning and translation into actions
   - Can children perceive and understand the actions they have to execute in order to reach the goal?
   - Do children think the actions they have to execute in order to reach the goal are fun?

3. Physical actions
   Are children able to perform the physical actions easily?

4. Feedback (both after wrong and correct actions)
   - Can children perceive and understand the feedback (if any)?
   - Is the negative/positive feedback motivating?

5. Continuation
   - Is the goal getting closer fast enough?
   - Is the reward in line with the effort children have to do in order to reach the goal?

6. Navigation (between screens)
   - Are the navigation possibilities clear?
   - Are the exits from a (sub) game clear?
Thinking aloud methods

- Performed by children
- Usually in order to detect problems
Standard thinking aloud

- Adult user sees product for the first time.

- User tries to accomplish predefined tasks.

- User talks aloud about what he/she does and thinks.

- Evaluator combines observations with what the user is saying to detect problems.
Standard requirements for TA

- The test facilitator should not interfere.
- Encouragement to think aloud should be given neutrally without engaging in conversation or betraying thoughts about the evolution of the test.
- Preferably the test facilitator leaves the room.
Problems with TA for children

- Children may find it hard to think aloud since their language skills are not fully developed.
- TA puts extra cognitive workload on the participants. Children are more likely to refrain from talking when it becomes hard.
- Shyness of children towards adults.
- Peculiar social setting: is there a right or wrong?
- Children feel like they are being tested, not the product.
How to make children TA

- Teach them to think aloud:
  - Have a group training
  - Provide an example of what you want from them
  - Do some small warm-up tasks
- Make the child feel comfortable:
  - Stay with the child
  - When the child asks for help first say something like ‘Just try it’
  - If necessary, provide help but do so as little as possible.
Providing help: Using Norman’s Interaction Cycle

- What is the goal? (this is slightly different for games than for most other applications)
- What am I going to do (intentions)?
- Which actions am I going to take?
- Can I perform the actions?
- What is the feedback?
- Do I understand the feedback?
- Am I getting closer to the goal?

There can be problems in each phase.
If necessary, provide help in the earliest possible phase.
Example of providing help: Goal
Alternative techniques: Co-discovery

- Two children do the test together.
- They are more likely to verbalise what they think when there is another child present.
- More natural situation.
- Does not work well for young children as they are not able to work together.
- Early-teen girls seem to be better at it than younger children or boys.
- Works better when the children are friends.
- Is harder to realise, more children needed.
Peer-tutoring

- Developed by Höysniemi, Hämäläinen and Turkki.
- First child learns to use the product from the adult test administrator.
- The child then teaches another child how to work with the product.
Peer-tutoring

- Advantages:
  - More symmetrical (two children instead of an adult and a child)
  - Natural and spontaneous verbalisation

- Problems:
  - Second child does not want to be taught by the other child.
  - Unbalanced communication, tutor talks much more than the tutee.
  - Tutor can forget how it works, test becomes more like co-discovery.
Picture Cards Method

- Children use a box and picture cards that depict different types of problems (and one positive feeling).
- Whenever a child feels like it he/she can place a card in the box.
- Is no replacement of Thinking-aloud, it is an addition to TA.
- Children are more aware of the kind of information one is interested in.
- Is rather new and needs more research.
Diaries

- Longitudinal studies where no evaluator is present.
- Well suited for discovering thoughts, feelings, and generally subjective experiences.
- Particularly appropriate to collect opinions and thoughts of testers in context.
- Can be very structured or more loose.
- Important to make clear that it is crucial to keep writing in the diary -> speak to the participant during the time of the study.
Parent evaluator method

- Diary and observation method for evaluation at home.
- Designed initially for very young children who cannot read or write.
  - Parent learns how to use the product.
  - Parent performs several test sessions with the child.
  - Parent records conversation and observations during each test.
  - Parent answers questions of the evaluator at various points in the study.
Parent evaluator method

- Advantages:
  - More comfortable for young children to talk to someone they know.
  - More comfortable for young children to be at home.
  - Parents are usually already involved (bringing their child etc.).
  - Parents understand their children’s habits and behaviours.
  - Not very different from the common situation that parents introduce an interactive artifact.
Parent evaluation

- **Drawbacks:**
  - Parents still feel that their child is being tested.
  - Parents provide too abstract and unspecific notes.
  - Parents need a lot of training.
Summative methods with children

- Surveys/questionnaires
- Longterm UX evaluation (can also be formative)
Surveys/Questionnaires

- Children are typically asked to comment on the appeal or usefulness of a product or supply some sort of product rating.
- If you have a survey for a large group of children with different ages you have to make sure it is usable for the youngest as well.
Guidelines for surveys

- Keep it short
- Pilot the language
- Provide assistance for nonreaders/poor readers
- Limit the writing (pictures, words to copy)
- Use appropriate tools and methods (e.g. Fun Toolkit)
- Make it fun (e.g. use glue, scissors, colored pencils)
- Expect the unexpected (backup plan)
- Don’t take it too seriously (do not overgeneralise)
- Be nice
Fun Toolkit

- Developed by Janet Read in 2001.
- For children from four years old to teenagers.
- 3 Tools:
  - Smileyometer
  - Fun Sorter
  - Again Again table
Smileyometer

• Easy to complete
• Quick to complete
• Requires limited reading ability
• Requires no writing
**Fun Sorter**

Completed Fun Sorter that was used to compare four input technologies (writing, speaking, mouse, keyboard) and presented with two constructs (worked the best, liked the most)

![Fun Sorter Table](image)

Most demanding of the Three tools.

*Fig. 2 A Completed Fun Sorter showing how children position the picture cards in the boxes*
### Again Again Table

<table>
<thead>
<tr>
<th>Would you like to do it again?</th>
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<tr>
<td>Yes</td>
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<tr>
<td>☑</td>
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</tbody>
</table>

Fig. 3 An excerpt from a Completed Again Again table that is being used to compare different word processing packages.

- Easy to understand
- No writing involved
Longterm UX evaluation

- MemoLine by Vissers, de Bot & Zaman

Did you think it was clear/not clear what you should do and how?

I played Monkeytales and found it clear what to do and how

I played Monkeytales and found it unclear what to do or how to do it

I did not play Monkeytales anymore
Rounding up

- You will now hopefully have an idea of some evaluation methods that can be used with and for children.
- You will understand drawbacks and advantages of these methods.
- You understand the ethics concerned in working with children during evaluations
Excercise

- We are going to evaluate a game using SEEM: [http://www.gamingcloud.com/play/rudolf-the-rabbit.html](http://www.gamingcloud.com/play/rudolf-the-rabbit.html)
- You will receive a manual for SEEM and some problem reports
- One problem per report
- The evaluation is initially individual, at 11:45 you are asked to take your reports to your group and discuss them
- Hand in all your reports to Robert at the end of the day.
- **Write your name and the course code on all reports!**