Exploring the Role of Children as Co-Designers – Using a Participatory Design Study for the Construction of a User Experience Questionnaire

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Resume of the presenter

• Lea is currently working as a research assistant and PhD student at the Institute for Information science and natural language processing at University of Hildesheim.

• From 2018-2020 she worked in the EU-funded project “Enervation”, which examined the use of game mechanics, dynamics and positive user experience for the development of a gamified web application to train pupils from primary schools about energy saving and sustainability at home.

• Her PhD is about the development of a user experience framework to do user experience research and evaluation studies with children between 8 and 14.
Topics of interest
Overview

• Background and aim
• Methodology
  • UX Workshop with Children
  • Learning App “Anton”
• Findings
• Conclusion
• Contribution to the research area

Background and aim of the study

• Most User Experience (UX) questionnaires validated and constructed with adult users and usability experts (Laugwitz, 2008; Hassenzahl 2003)

• Children as users and target group of interactive products (Hanna et al., 2004; Read et al., 2008)

• Standardized UX questionnaires adapted to children’s (language) competencies and knowledge are still not available

• Participatory design approach to develop a UX questionnaire for a specific app with children and for children

• Research questions
  • Is it feasible that children create a questionnaire measuring the UX of a specific product?
  • How reliable is the designed questionnaire?
Methodology: UX Workshop

- Investigation into UX questionnaire design based on common construction processes with bipolar scales (Laugwitz et al., 2008; Hassenzahl et al., 2003)

- Expert workshop for creation of item pool
- Creative session to collect useful items for UX evaluation
- Sorting (remove redundant and inappropriate words)
- Voting for top list of suitable words
- Selection of antonyms
- Evaluation within user studies with different systems and devices
- Validation: Examination of internal consistency of scales and factor analysis
Methodology

• Include children in HCI research:
  • Roles as informants in technology brainstorming experience (Druin, 2002)
  • Children as active participants in user research
  • Need to understand children’s emotions and feelings when interacting with (learning) apps
  • E.g. quantitative user experience measuring after a user test study

→ Children as design partners and tester of a UX questionnaire
The Anton App - Functionalities
(Heine and Hörmeyer, 2020)

- Learning app for grade 1-8
- 4 Subjects:
  - German, math, music and sciences
- Gamified learning app
- Collected points in lessons can be redeem in games
- Use of ranking lists, badges, points, audio feedback

Motivierend durch Belohnungen für gutes Lernen.
Sammle Sterne und Pokale und Spiele spannende Spiele.
UX Workshop with children

- Need to explain the concept of UX and evaluation of interactive products
- Show and explain the UEQ questionnaire (Laugwitz et al., 2008) and the concept of semantic differential scales
- Based on this, children can identify semantic differential word pairs, UX categories for item pairs, a rating scale and the needed length of a product specific questionnaire
- Within a “child-friendly” introduction, children are able to design a UX questionnaire (same construction process as common UX questionnaires) for a learning app
- Constructed questionnaire is validated in a first user study with 230 children (grade 6 and 7)
UX Workshop

<table>
<thead>
<tr>
<th>1st part: Introduction</th>
<th>2nd part: Workshop</th>
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<tr>
<td>Aim: Introduction into the concept of user experience and evaluation of apps</td>
<td>Aim: Construction of the questionnaire</td>
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<tr>
<td>• Presentation of the concept of UX and the app (Video)</td>
<td>• Brainstorming session (<em>What is important to evaluate the app?</em>)</td>
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<td>• Presentation of the UEQ (Laugwitz et al., 2008)</td>
<td>• 1st step: Discussion of word pairs (Item per Item)</td>
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<td>• “Anton” App Testing time (~35 minutes)</td>
<td>• 2nd step: UX categories</td>
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<td>• 6 children of grade 7 participated in the workshop, observation as well as notes are used to document the process</td>
<td>• 3rd step: Design decisions on the questionnaire</td>
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<td>• Pupils work together to find and discuss useful bipolar words and phrases for the evaluation of the learning app</td>
<td>(e.g. rating scale, open-end questions)</td>
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<td>• Pupils discuss contrasting words („What is the opposite of fun?”)</td>
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<td>• Participants consider younger children´s competencies (“First grader won´t understand the word stimulate”.)</td>
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Challenges

• For children:
  • Difficult start into the creative part
  • Creation of word meaning and word finding is difficult
  • They find it challenging to identify “the right” opposite, contrary word

• Overall limited number of words: Only 20 bipolar word pairs (positive and negative) are named and discussed

• Likert scale: 5 instead of 7 points, children chose stars instead of points

• For the researchers:
  • High effort for the implementation of the workshop
Developed UX Questionnaire

- 16 semantic differential items in 3 scales
  - Learning development, (quality of the app content), if the system motivates or if it is adequate for learning.
  - Overall impression of the app contains item pairs for functionality, efficiency, fun and entertainment.
  - Design and appearance includes 5 items of color design and purpose.

- Which aspects of UX are important for children?
- Evaluation of UX based on pragmatic as well as hedonistic aspects
- The design but also the subjective learning success is important
- Children add a free text for further explanations: Please explain why are you satisfied or unsatisfied with the app.

Figure 1: Final version of the UEQ.
First validation study

- Examine the performance and reliability (internal consistency) of the newly developed UX instrument (Cronbach, 1951)

- The questionnaire is applied in a user test study to evaluate the UX of the learning app with pupils from grades 6 and 7 of a comprehensive school in Germany

- UX questionnaire is compared to a German UX questionnaire for teenagers (Hinderks et al., 2012)

- During a playtime of 20 minutes, the pupils explored the app on mobile devices in groups of three or four children

- 207 out of 230 children completed the questionnaire

Table 1: Cronbach’s Alpha values

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<th>Scale</th>
<th>α</th>
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<tr>
<td>Overall</td>
<td>0.88</td>
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<tr>
<td>Learning development</td>
<td>0.75</td>
</tr>
<tr>
<td>Overall impression of the app</td>
<td>0.80</td>
</tr>
<tr>
<td>Design and appearance</td>
<td>0.71</td>
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Findings

• Children can assume the role of UX designers:
  • Identify needed UX constructs for evaluation of a learning app
  • Detect useful bipolar word pairs for different UX dimensions
  • Find alternative, child-friendly possibilities for common rating scales
  • Provide a shorter UX questionnaire version

• Reliability analysis shows good validation results for the new questionnaire

• Children provide pragmatic and hedonic UX aspects for evaluation

• UX workshop is useful for brainstorming with children, but complex in its implementation
Conclusion

• The study investigated the use of participatory design to construct a UX questionnaire with pupils of grade 7 based on participatory design and early user involvement

• Participatory design is a valuable method to do user experience research with children

• Within a collaborative brainstorming session, the target group is able to do identify words and item pairs to evaluate the learning app and discuss their usefulness for younger users

• Design and construction of a adapted, child-friendly version of common UX questionnaires using bipolar terms
Contribution to the research area

• Possibility to quantify user experience of younger pupils
• An instrument for measuring children's user experience by using a participatory approach recommended by the “Child-Computer-Interaction” community (Read et al., 2008)
• More insights into children's perspectives of user experience of learning apps
• Selection of semantic differentials based on children’s knowledge understanding
Further research needs

- UX questionnaire validation with different learning apps and younger children
- Use of more participatory design and other user centered methods to do user experience research with children
- UX questionnaire construction and design for primary school pupils
- Selection of word pairs based on children’s vocabulary
- Multilingual UX questionnaires for younger children
- Goal: Validation a UX framework for UX research with children of different ages and reading skills
References


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Thank you for your attention!

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