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

Authors: Lea Wöbbekind, Thomas Mandl and Christa Womser-Hacker

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Lea Wöbbekind, woebbek@uni-hildesheim.de

Institute of Information Science and Natural Language Processing

University of Hildesheim

Germany

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

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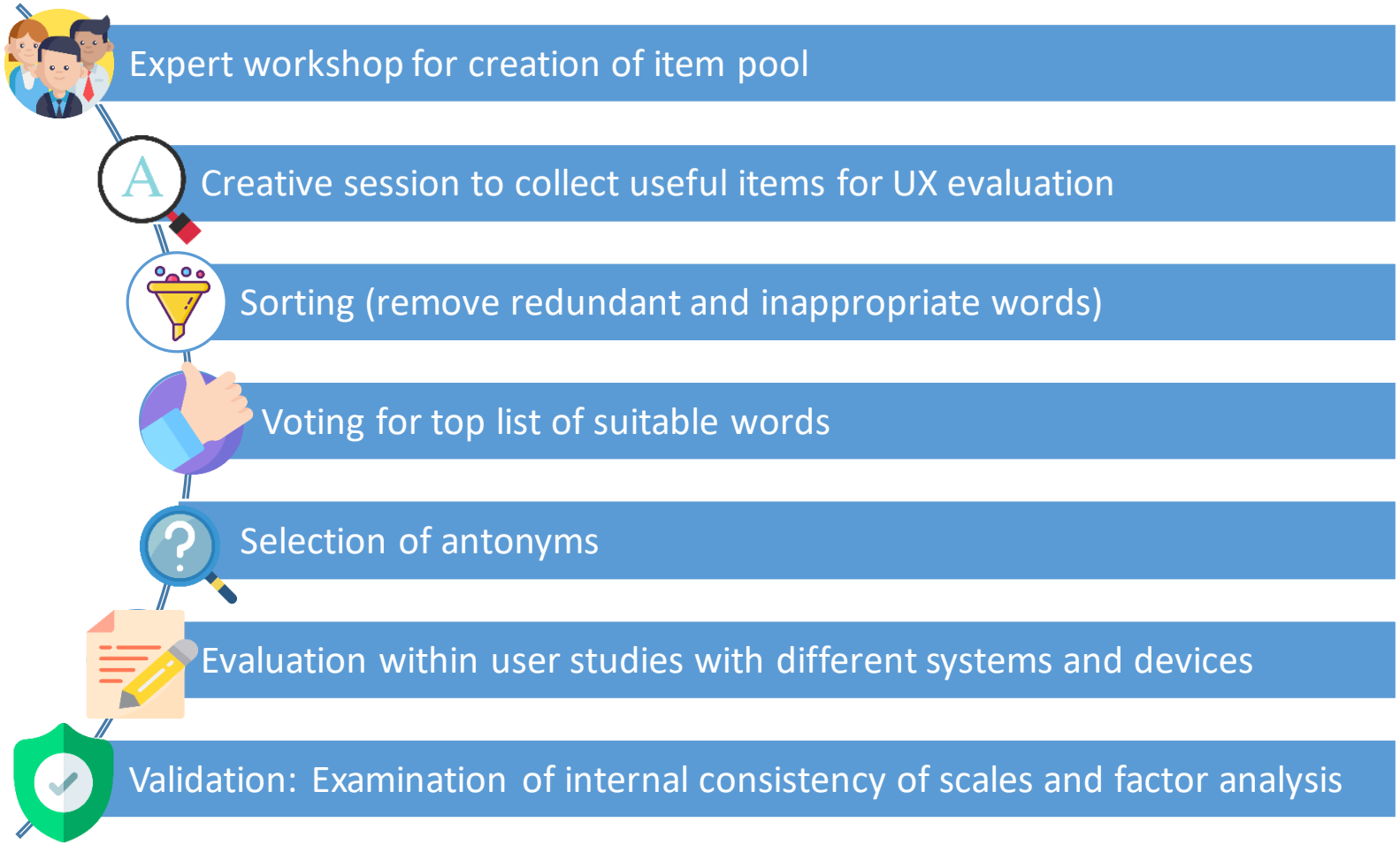
Background and aim of the study

- 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)



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

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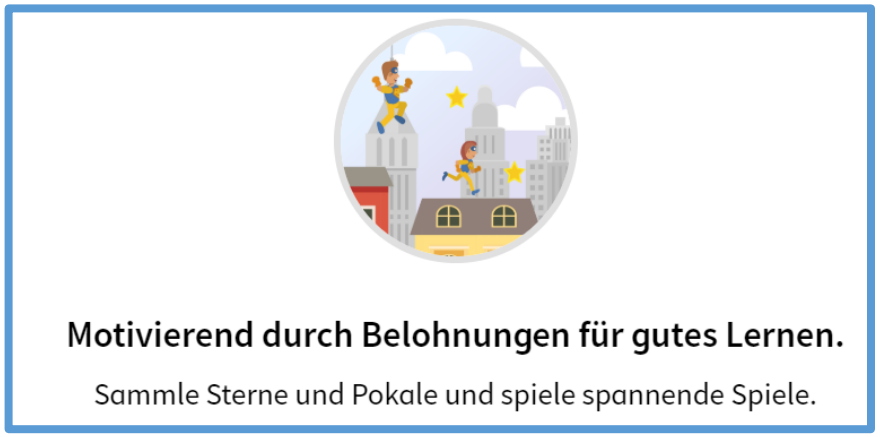
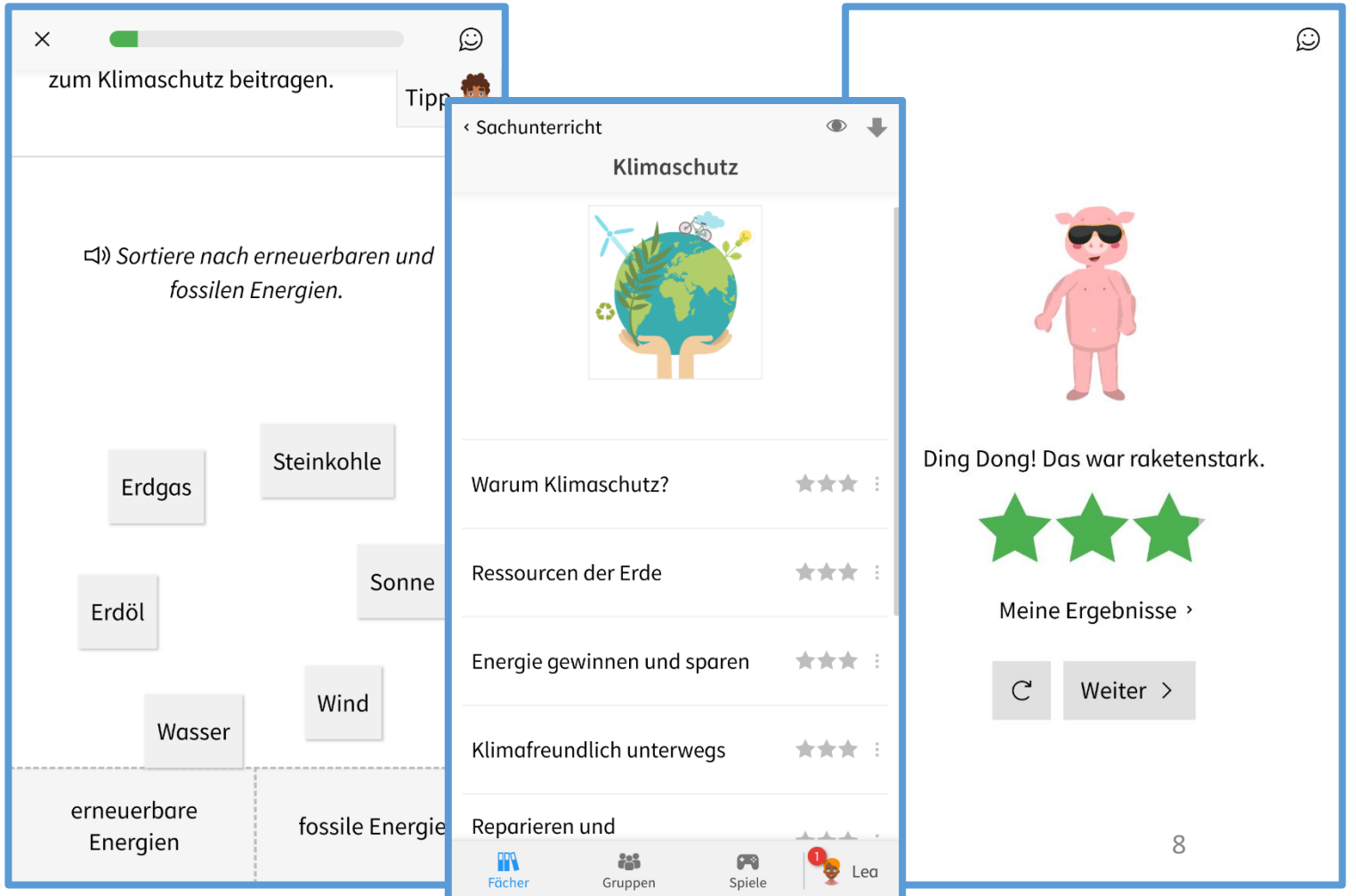
The Anton App- Functionalities (Heine and Hörmeyer, 2020)

- 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





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

1st part: Introduction	2nd part: Workshop
Aim: Introduction into the concept of user experience and evaluation of apps	Aim: Construction of the questionnaire
• Presentation of the concept of UX and the app (Video)	• Brainstorming session (*What is important to evaluate the app?*)
• Presentation of the UEQ (Laugwitz et al., 2008)	• 1st step: Discussion of word pairs (Item per Item)
• "Anton" App Testing time (~35 minutes)	• 2nd step: UX categories
	• 3rd step: Design decisions on the questionnaire (e.g. rating scale, open-end questions)

- 6 children of grade 7 participated in the workshop, observation as well as notes are used to document the process
- Pupils work together to find and discuss useful bipolar words and phrases for the evaluation of the learning app
- Pupils discuss contrasting words („What is the opposite of fun?")
- Participants consider younger children´s competencies ("First grader won´t understand the word stimulate".)

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

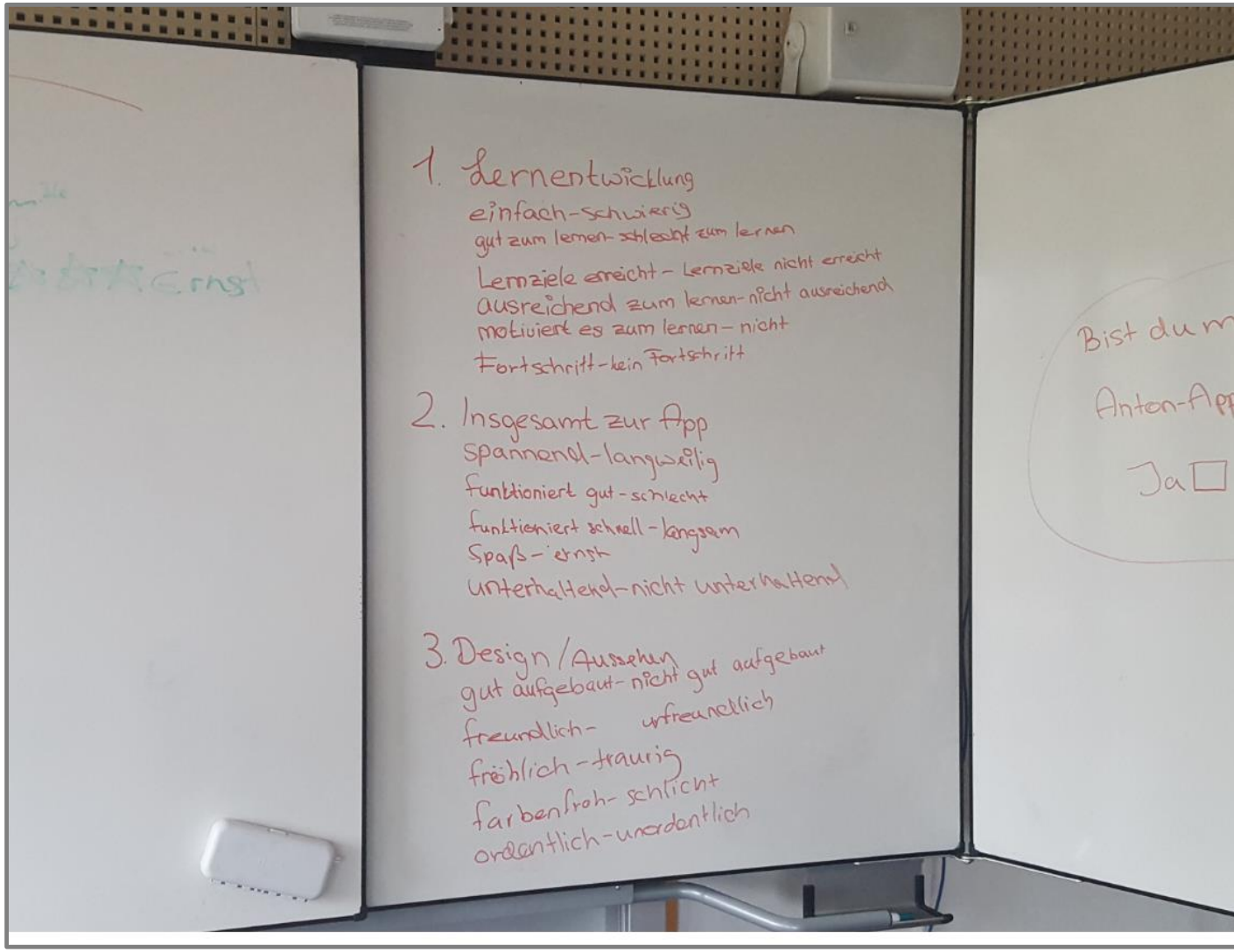


Figure 2: Brainstorming session

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.*

Questionnaire for the Anton-App: Please give your opinion.

1. Learning development

		1	2	3	4	5	
1	easy	☆	☆	☆	☆	☆	difficult
2	suitable for learning	☆	☆	☆	☆	☆	Not suitable for learning
3	achieved study goals	☆	☆	☆	☆	☆	Not achieved study goals
4	Sufficiently for learning	☆	☆	☆	☆	☆	Not sufficiently for learning
5	It motivates to learn	☆	☆	☆	☆	☆	It does not motivates for learning
6	progress	☆	☆	☆	☆	☆	no progress

2. Overall impression of the app

7	exciting	☆	☆	☆	☆	☆	boring
8	It works well	☆	☆	☆	☆	☆	bad
9	It works fast	☆	☆	☆	☆	☆	slow
10	Fun	☆	☆	☆	☆	☆	serious
11	entertaining	☆	☆	☆	☆	☆	not entertaining

3. Design and appearance

12	well structured	☆	☆	☆	☆	☆	Not well structured
13	friendly	☆	☆	☆	☆	☆	Not friendly
14	joyful	☆	☆	☆	☆	☆	sad
15	colorful	☆	☆	☆	☆	☆	simple
16	tidy	☆	☆	☆	☆	☆	untidy

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

Scale	*α*
Overall	0.88
Learning development	0.75
Overall impression of the app	0.80
Design and appearance	0.71

Table 1: Cronbach's Alpha values

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

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Contact: woebbek@uni-hildesheim.de