

QUALITATIVE DATA ANALYSIS
IN DESIGN RESEARCH:

Feeler proof-of-concept research case

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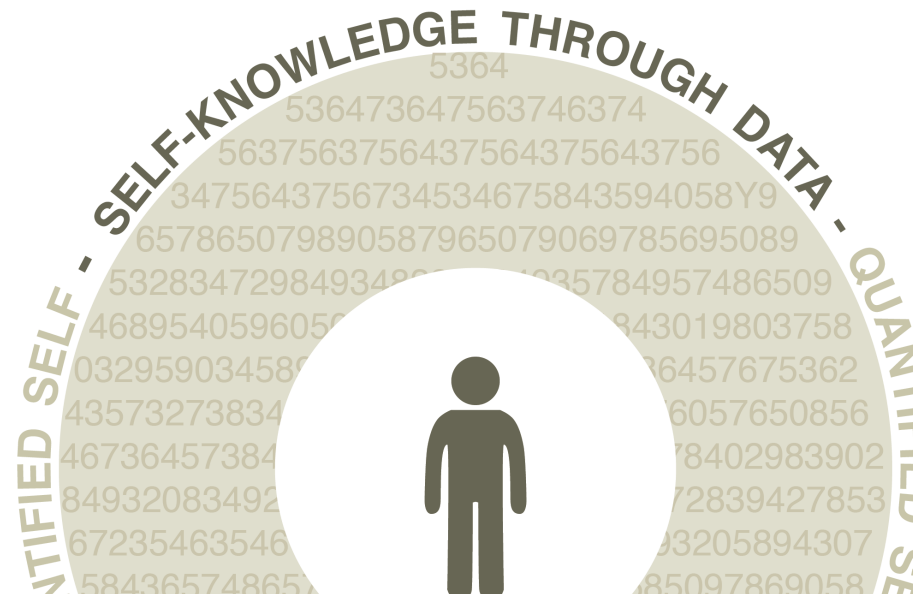
Learning Environments research group

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I. Introduction

The **Quantified Self** (QS) movement is a growing global effort to use new mobile and wearable technologies to automatically obtain personal data about everyday activities.

Lee 2013



I. Introduction

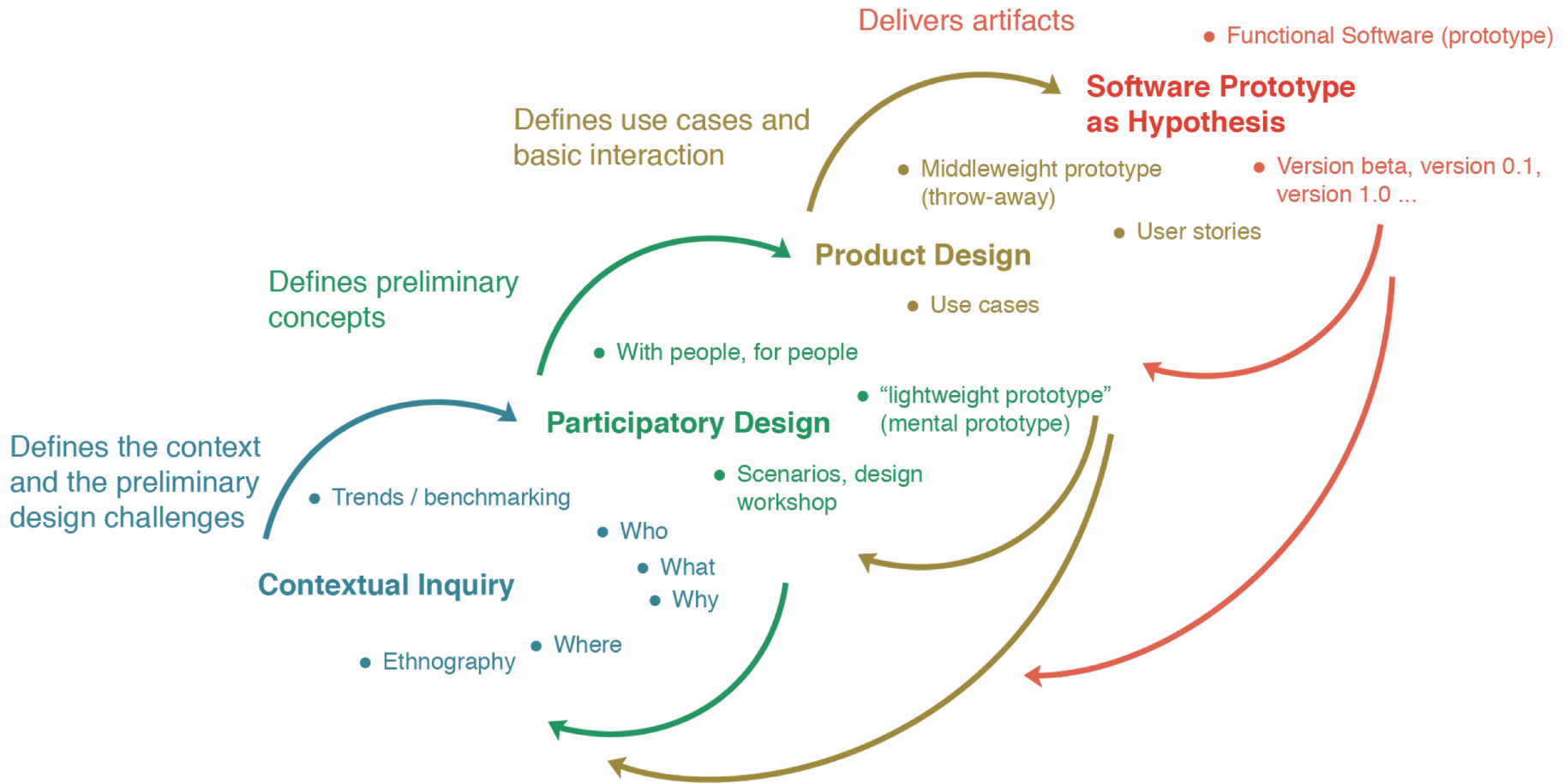
- Several scholars have highlighted the role of QS technologies for **supporting reflection**

Li, Dey & Forlizzi 2011; Rivera-Pelayo et al. 2012

- Self-monitoring is considered to be one of the first steps to **self-regulated behavior**

Schunk, 2001

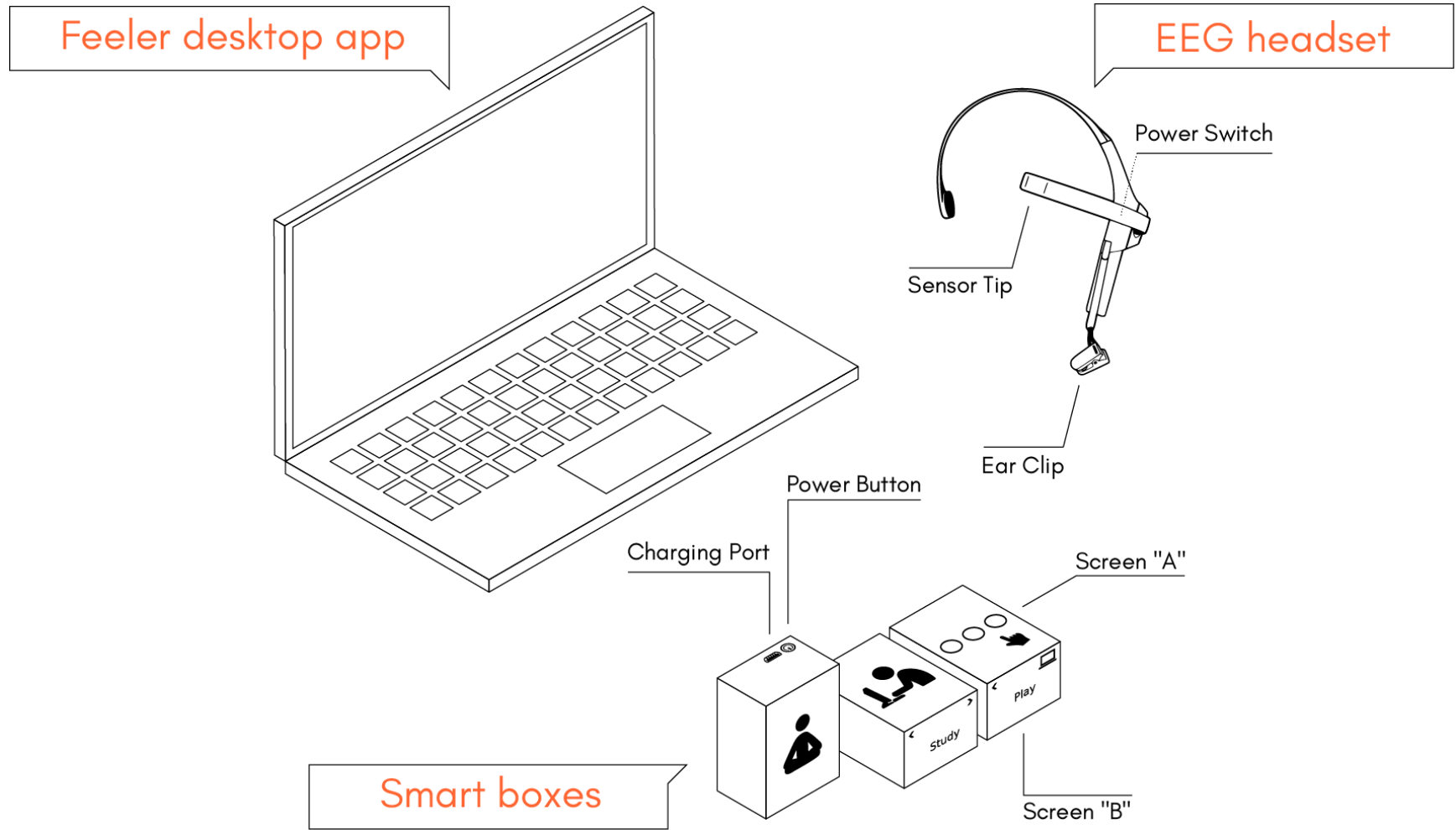
2. Research-based design methodology



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Research stage	Description
Contextual Inquiry	6 semi-structured interviews with graduate students 4 subject-expert interviews 4 days of field observations in a university library Literature review 3 focus groups (n=15) Questionnaires before and after the Participatory Design (PD) sessions
Participatory Design	3 PD workshops 2 open sessions
Product Design	4 prototypes , 2 of which are functional
Software Prototype as Hypothesis	User tests with functional prototypes: - Feeler v.1.0

4. Feeler Prototype



5. Feeler proof-of-concept research

5.1. Objectives

- Validate the **design concept**
- Explore to what extent the prototype supports learners' **awareness** and **reflection** on study habits



5. Feeler proof-of-concept research

5.2. User tests

Participants:

6 graduate students

Different nationalities, all fluent in English

Tasks:

Reading an academic paper and solving a 3D puzzle.

Duration:

30 minutes for independent study activities + 45 minutes: interview = 1h 15min

Number of sessions:

1 test per participant (n=6)

5. Feeler proof-of-concept research

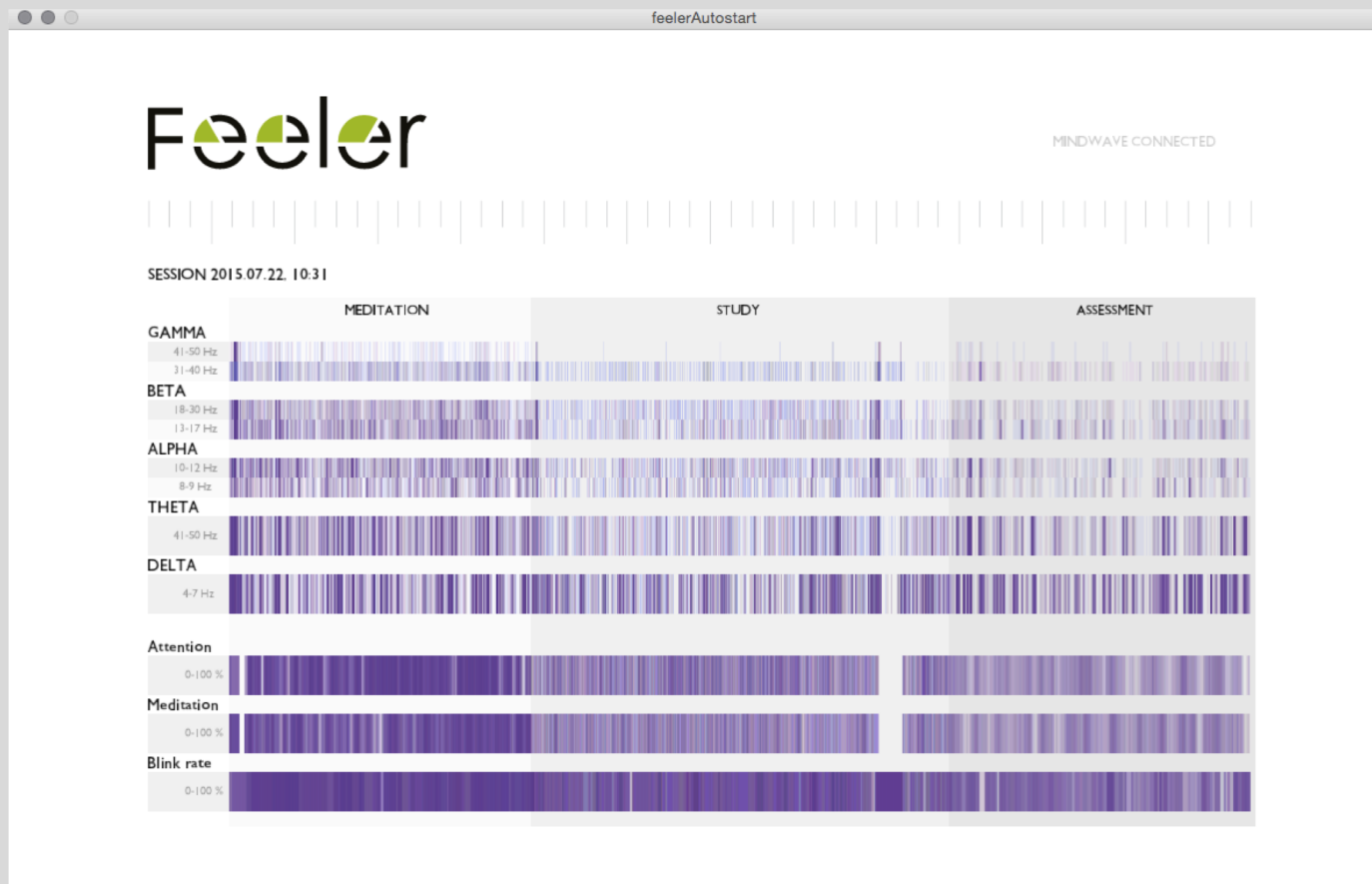
5.2. User tests



Images of Feeler prototype user tests

5. Feeler proof-of-concept research

5.2. User tests



5. Feeler proof-of-concept research

5.3. Data collection techniques



5. Feeler proof-of-concept research

5.4. Research data



Image published by Flickr user "Eelco".

5. Feeler proof-of-concept research

5.5. Thematic analysis

Thematic analysis is oriented to the **identification**, **analysis** and **reporting** of **patterns** (themes/categories) present in research data

Braun & Clarke, 2006



In the Feeler proof-of-concept research we conducted a thematic analysis of the **think-aloud** and the **interview audio recordings** in order to identify **patterns in the content**

5. Feeler proof-of-concept research

5.5. Thematic analysis

The screenshot displays the Atlas.ti software interface for a video file named 'user3_video02.mp3'. The main window shows a video player with a timeline and a list of applied codes. The codes are:

- C3_Appropriation_TR (3:188 user3_video02.mp3)
- C2_Curiosity_B (3:216 06:57:88 - 07:09:02)
- C2_Curiosity_ED (3:216 06:57:88 - 07:09:02)
- C3_Puzzlement_B (3:217 07:09:30 - 07:18:01)
- C3_Puzzlement_ED (3:217 07:09:30 - 07:18:01)

The interface includes a sidebar with a document list, a top menu bar with 'Add Coding' and 'Quick Coding' buttons, and a right-hand panel with document metadata and a comment field. The video player at the bottom shows a progress bar at 07:05.61 and a total duration of 32:33.30.

Document 3
user3_video02.mp3
Comment
No Comment
Status
Created: 11 September 2015
Super
Changed: 11 September 2015
Super

atlas.ti
QUALITATIVE DATA ANALYSIS

5. Feeler proof-of-concept research

5.5. Thematic analysis / Coding scheme

The coding scheme or codebook is a **classification of the key themes** used to categorise the observed data into the expected thematic areas of qualitative data analysis.



The coding scheme used in the thematic analysis of Feeler user tests interviews was developed following a **inductive-deductive approach**

5. Feeler proof-of-concept research

5.5. Thematic analysis / Coding scheme

C1/ Non-reflection

c1a: No expectations

C1b: Not understanding

C2/ Recognition

c2a: Integration

c2b: Curiosity

C3/ Reflection

c3a: Puzzlement

c3b: Appropriation

C3c: Transformation

Based on theory:

- Dewey, 1933
- Kember et al., 2000
- Kolb, 1984
- Mezirow, 1991
- Peltier, Hay & Drago, 2005

5. Feeler proof-of-concept research

5.5. Thematic analysis / Coding scheme

Code	Definition	Example
c1a: No expectations	The person doesn't express any particular interest, question or expectation about the data.	"I hadn't any particular expectation about the EEG data"

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5.6. Thematic analysis / Validity & reliability

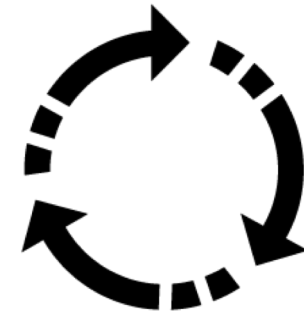
VALIDITY



tradeoff



RELIABILITY



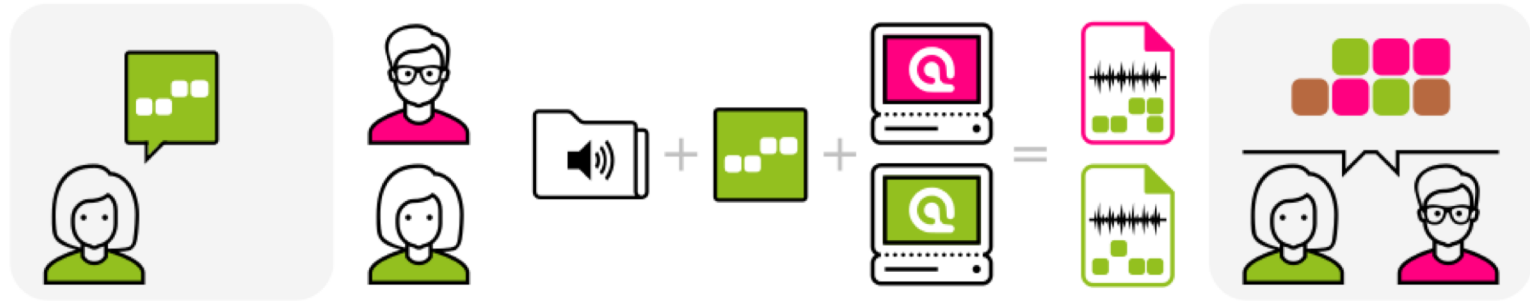
Connected to **accuracy**

The coding scheme provides rules
for element orienting pattern
recognition

Refers to **consistency**
with a standard

VALIDATION OF THE CODING PROCESS

VERSION 1.0



1
Principal researcher elaborates a first version of the coding scheme

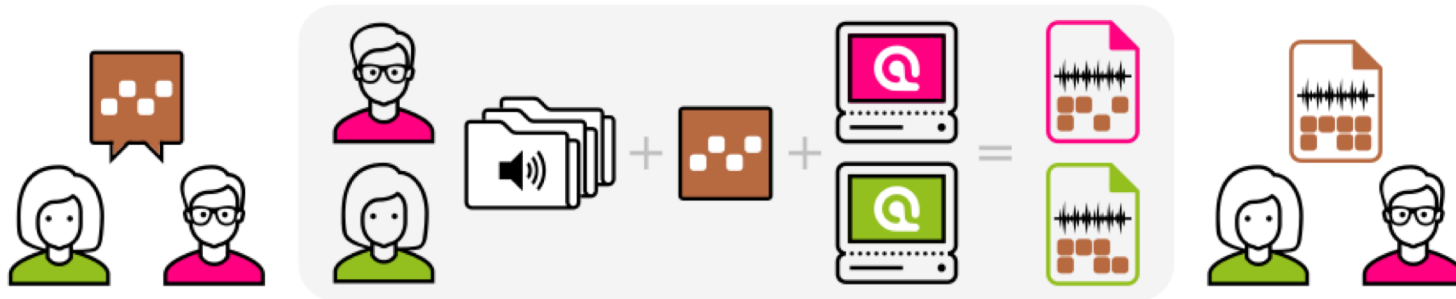
2
Another researcher is trained according the first version of the coding scheme

3
The two researchers independently code 10% of the interviews recordings

4
Calculation of the intercoder reliability

5
Discussion on the coding disagreements

VERSION 2.0



6
Revision of the coding scheme

7
The two researchers independently code 90% of the interviews recordings

8
Discussion on the coding disagreements. Recoding by consensus

5. Feeler proof-of-concept research

5.7. Thematic analysis / Challenges in the coders' task

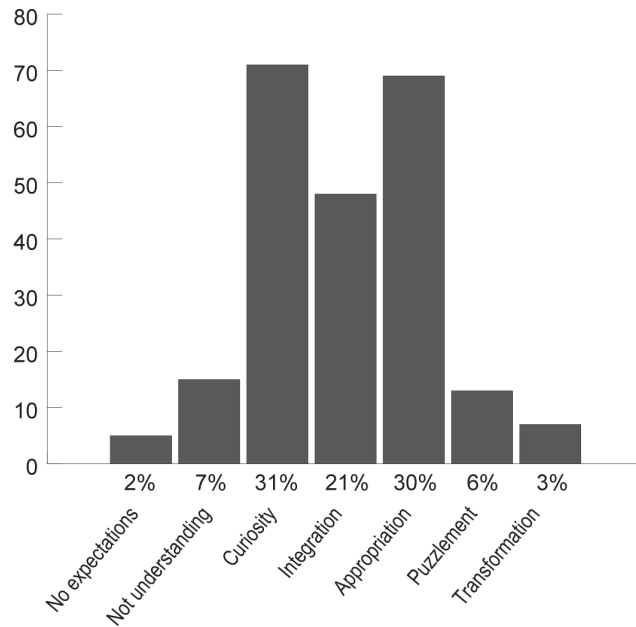
- Lack of consistency
- Bringing their own schemas into play (interpreting rather than recognizing patterns in the content)
- Saturation (by fatigue)

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5.8. Thematic analysis / Data analysis & results

1

Distribution of the codes identifying behaviors connected to reflection



2

Identification of subthemes and discussion of the results in light of existing research

Reflection levels that interactive technology can support (Fleck and Fitzpatrick, 2010)

1. Revisiting

2. Revisiting with explanation

3. Dialogic reflection

4. Transformative reflection

5. Critical reflection

6. Qualitative data analysis

Recommendations on coding

- Avoid introducing your own biases by carefully reading the data.
- Iterate, make sure your codes are consistent.
- Chose “good moments” for coding.
Limit the amount of time for a coding session.

Thanks!

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Published work



Durall, E., Leinonen, T., Gros, B., & Rodriguez-Kaarto, T. (2017). Reflection in Learning through a Self-monitoring Device: Design Research on EEG Self-Monitoring during a Study Session. *Designs for Learning*, 9(1), 10–20.