Audit trail procedure

The holy grail to ensure the quality of qualitative research?

**PhD Programme UMCU
Course
Methods of Life Science Education Research**

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IMPACT YOUR FUTURE

Introduction

- Bas Agricola

- Hoofddocent pabo en master educational needs – curriculum design

- Educational researcher – Research group Vocational Education - Research topics feedback, feedback literacy, programmatic assessment
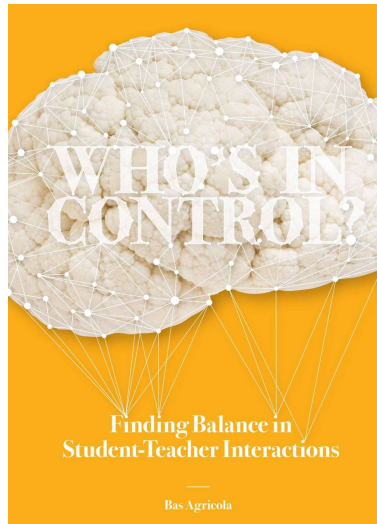
Research group vocational education

The central research question of the research group is: How does vocational education help professionals to deal with the complexity and dynamics of practice and to give direction to their actions and their development?

PhD Defence

Audit Trail Procedure

My phd defence was June 2019,

PhD student

There are many types of PhD candidates. Many of them are employed by a university and receive a salary. However, there are also people who write PhD dissertations on top of their day jobs, or in their free time. These are called external PhD students.

'Who is an external PhD student?'

Context of PhD

- Undergraduate dissertation
- Feedback conversations
- Teacher-student interactions

Before I start talking about the audit trail procedure and other measures to ensure the quality of your qualitative research.
I will first provide a short introduction about my research from my phd.
The context of all studies consisted of students studying in higher education, at the bachelor program of HAN university and especially about the teacher student interaction during supervision meetings about the undergraduate dissertation (or bachelor thesis but that is really awkward for a native).

Overview of PhD studies

Five empirical studies	Focus	Data gathering	Data analysis	Quality check
1. Experimental study	115 students	2 questionnaires	ANOVA/ANCOVA	Statistical testing
2. Observational study	4 teachers	16 observations	6,833 segments	Interrater
3. Mixed method study	10 triads	20 observations	25,968 dialogue acts	Automatic coding
	20 students	2 questionnaires	Wilcoxon rank	Statistical testing
4. Stimulated recall study	7 teachers	7 interviews	97 segments	Audit trail
	6 students	6 interviews	76 segments	
5. Mixed method lesson study	4 teachers	9 observations	77 indicators	Audit trail
		15 learning reports	248 activities	
		4 interviews	207 processes	

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Before I start talking about the audit trail procedure and other measures to ensure the quality of your qualitative research.
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What is quality of research?

Thus, we have gathered here to discuss the topic of ensuring the quality of your qualitative research.

Quantitative research

The Independent Samples t-test compares the means of two independent groups in order to determine whether there is statistical evidence that the associated population means are significantly different.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig. (A)	t (B)	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper (C)
Mile time	Equal variances assumed	102.98	.000	13.475	390	.000	0:02:14	0:00:10	0:01:55	0:02:34
	Equal variances not assumed			15.047	315.846	.000	0:02:14	0:00:08	0:01:57	0:02:32

## What is the qualitative equivalent?

In quantitative research we have got a lot of instruments to compute how well the quality is of our findings, if it is about how well our sample represents the population, or how significantly the differences are that we found between two or more groups. But what is the qualitative equivalent.

Quality of qualitative research

- Posing valid research questions
- Triangulation
- Interrater reliability
- Member check
- Audit trail procedure
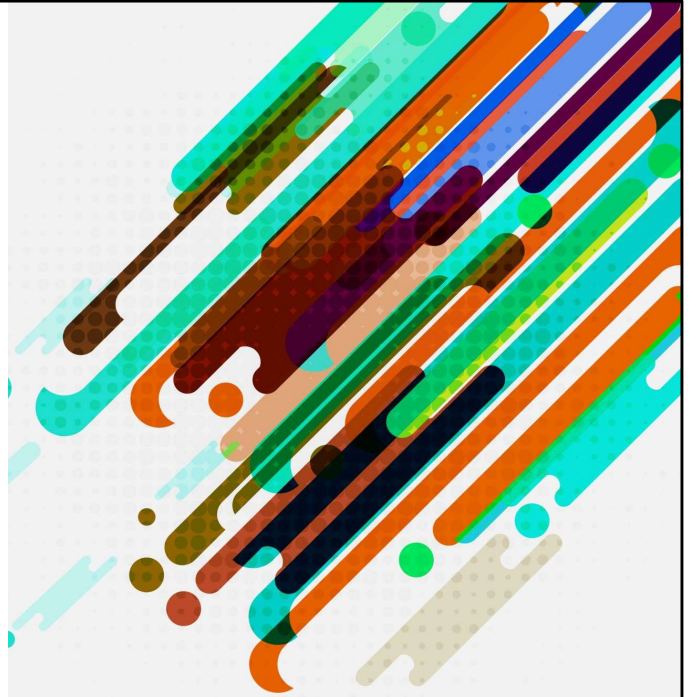
Off course, there is not one answer to that question, I have listened to you during several days and several topic came along, on the front side writing a strong theoretical framework from which the research questions and instruments are build, or build a method with different instruments (observation and interview), different methods (interview and questionnaire), different participants (teachers and students). Or to the end when you can check your findings with your participants, do a interrater reliability analysis, or perhaps an audit trail.

Qualitative research

'With complex research processes there are no standardized procedures to rely on.'

'The researcher is a crucial "instrument" in the creation of conceptual and strategic solutions.'
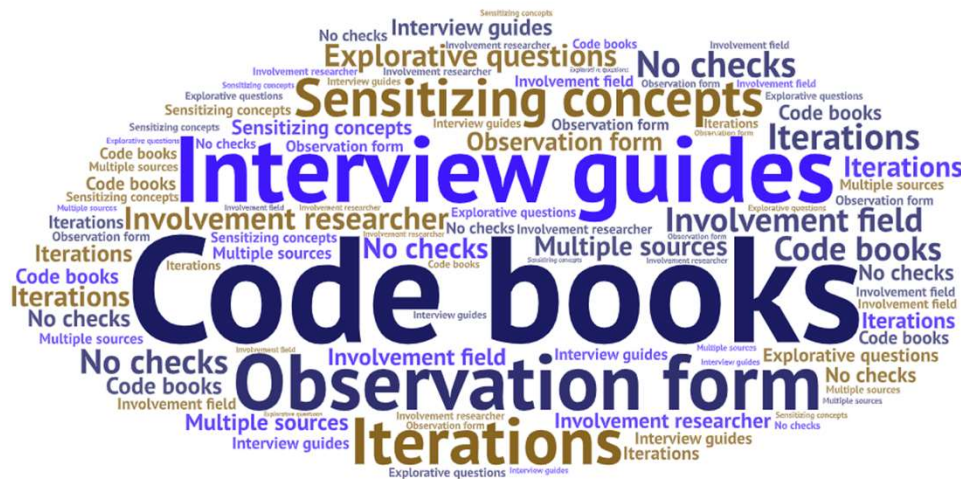
Akkerman et al. (2008, p259)

In the article from Akkerman and others they propose a specific procedure to conduct an audit trail procedure. And in fact I have followed this procedure twice during two studies of my phd.

The need for an audit trail is nicely claimed by the authors as

Complex research process

And how complex are these processes. Well often we have got really explorative questions, with interview guides filled with open questions, that lead to really rich and thick transcripts, in which we search for sensitizing concepts, we conduct codebooks, that are transformed when we glide through the open, axial and selective coding.

Thus, these phases are often hard to understand for an outsider ,for a reader, a reviewer, an editor. An audit comes in hand. An audit can assess the whole procedure of starting with your literature and ending with your conclusion.
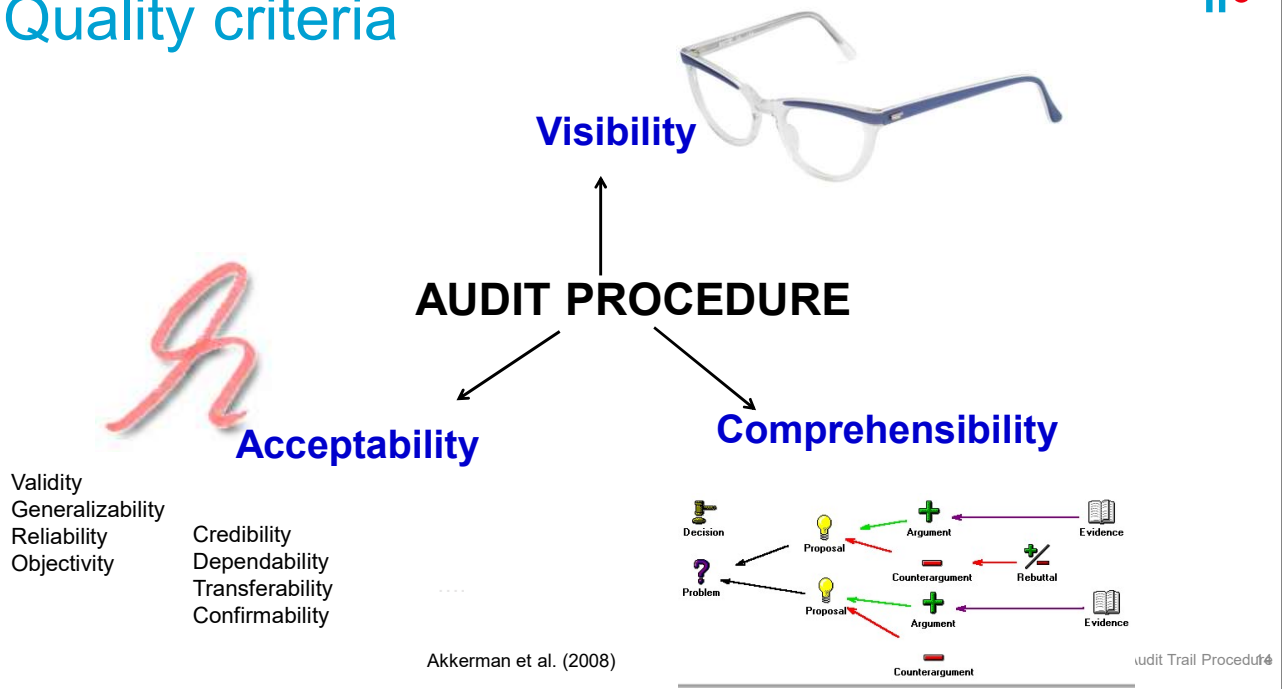
Objects of assessment

- Designing and writing research proposal ➢ Supervisors

- Gathering data ➢ Audit

- Analyzing data, results and conclusions ➢ Audit

- Reporting the research ➢ Reviewers, editors

When we look at what objects you can assess during the research process we can divide them in 4 types.

Each object can be assessed by another assessor

Quality criteria

Visibility

AUDIT PROCEDURE

Acceptability   Comprehensibility

Validity
Generalizability
Reliability   Credibility
Objectivity   Dependability
                     Transferability
                     Confirmability

Akkerman et al. (2008)

Akkerman and others have proposed three criteria to use when assessing.

So we got visibility, thus how transparent have you described your steps of data gathering and data analysis. For example how did you construct the interview guide, on which theory was it based on, how long did the interviews last etc.

To get a better grip of these three criteria I would like you to read a passage from an article I have brought with me, and I would like you to read a part of the method section.

Article Jager et al. (2019)

Read two paragraphs, it will take you less than 5 minutes:

- Data collection

- Data processing and analysis

What is your opinion about the quality of these research phases?

Visibility

- Are <u>decisions</u> described and/or communicated?
- Is the procedure (data gathering and data analysis) written down in a <u>transparent</u> way?

Data collection

Six bilingual interviewers who spoke either Arab, Berber or Turkish were recruited and trained for the interviews. All interviews took place at participants' home, to ensure a safe environment to talk freely. In several cases, children or spouses were also present.

All interviews were recorded, transcribed and translated by the interviewers.

Jager, van der Sande, Essink-Bot, & van den Muijsenbergh (2019)

Comprehensibility

- Enough <u>evidence</u> for the decisions that were made?
- Are the decisions <u>explicated</u>?
- Is the procedure (data gathering and data analysis) written down in a <u>comprehensible</u> way?
- Are the differences that emerged between the proposed method and the actual analysis written down in a <u>comprehensible</u> way?

Data processing and analysis

The data were anonymized and processed by the computer software program Atlas.ti. The interviews were read twice to gain an overall impression of the material. The data were subjected to a deductive qualitative analysis using an iteratively developed coding frame based on the ASE model[18] and the Kleinman explanatory model of illness.[19] This framework was expanded iteratively with newly emerging codes. We report data in this paper following overarching themes; to give insight into the linkage with the models used, we mention the corresponding model between brackets. To ensure reliability, the first six interview transcripts were independently coded and analyzed by two researchers (M.J., M.v.d.M. or R.v.d.S.). Differences were discussed until concordance was reached.

Acceptability

- Has quality been maintained in terms of <u>reliability</u> and <u>validity</u> throughout all steps undertaken?
- Is the quality of the data and analysis ensured and/or harmed?
- With respect to *data gathering* the timing of data gathering, the content, and the behavior of the researcher are assessed.
- With respect to *data analysis* the choices in categorization and the way such categories are applied are assessed.
- How well is the <u>sample</u> of participants described? Is the sample representative?

- How much <u>tension</u> can be determined between the proposed method of data gathering and the specific circumstances of the teachers and students?

Feedback conversations (study 1)

- Experimental 2x2 factorial design
- Questionnaires among 115 students
- Independent variables: verbal vs written feedback and feedback request form
- Dependent variables: feedback perception, self-efficacy, and motivation.

Agricola, B. T., Prins, F. J., & Sluijsmans, D. M. A. (2020). Impact of feedback request forms and verbal feedback on higher education students' feedback perception, self-efficacy, and motivation. *Assessment in Education: Principles, Policy & Practice, 27*(1), 6-25. *doi:*https://doi.org/10.1080/0969594X.2019.1688764

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In my first study we focused on written and verbal feedback. Our students appreciated verbal feedback more than written feedback.
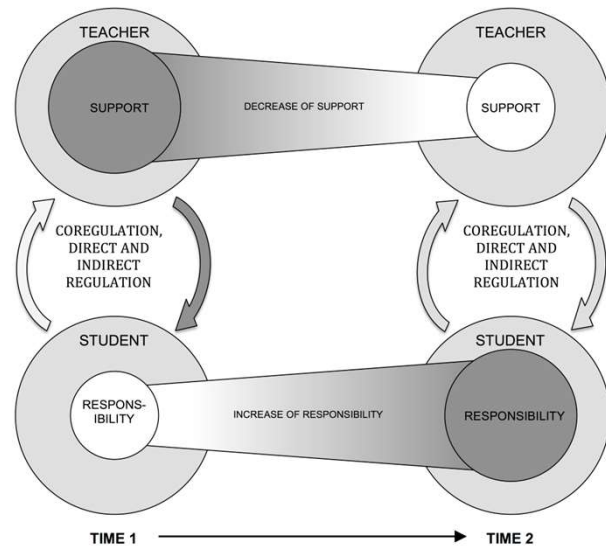
Diagnosis (study 2): Observational data

Agricola, B. T., Prins, F. J., van der Schaaf, M. F., & van Tartwijk, J. (2018). Teachers' diagnosis of students' research skills during the mentoring of the undergraduate thesis. *Mentoring & Tutoring: Partnership in Learning, 26*(5), 542-562. doi:https://doi.org/10.1080/13611267.2018.1561015

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This was the start to gain more focus on the feedback process during teacher-student interactions. In the second study we gained insight in how teachers diagnose their students' understanding, before providing feedback. A lot of teachers gave instruction without observable behavior of diagnosing student understanding.

Co-regulation (study 3): Observational and questionnaire data

23-12-2022

In our third study, we tested if our research supervisors decreased their amount of support when students gained understanding, providing them with more responsibility. Unfortunately, this shift was not observed.

Interactive decisions (study 4)

Bas T. Agricola, Frans J. Prins, Marieke F. van der Schaaf & Jan van Tartwijk (2021) Supervisor and Student Perspectives on Undergraduate Thesis Supervision in Higher Education, Scandinavian Journal of Educational Research, 65:5, 877-897, DOI: 10.1080/00313831.2020.1775115

That's why we focused on teachers' interactive thinking in the fourth study, on teachers' thoughts during their interactions with their students. A stimulated recall procedure was conducted to gather this information.

The article you have been reading was all about these interactions. During the coding of the interviews I was already thinking about how to ensure the quality, and I thought this study is a great opportunity to conduct an audit trail.
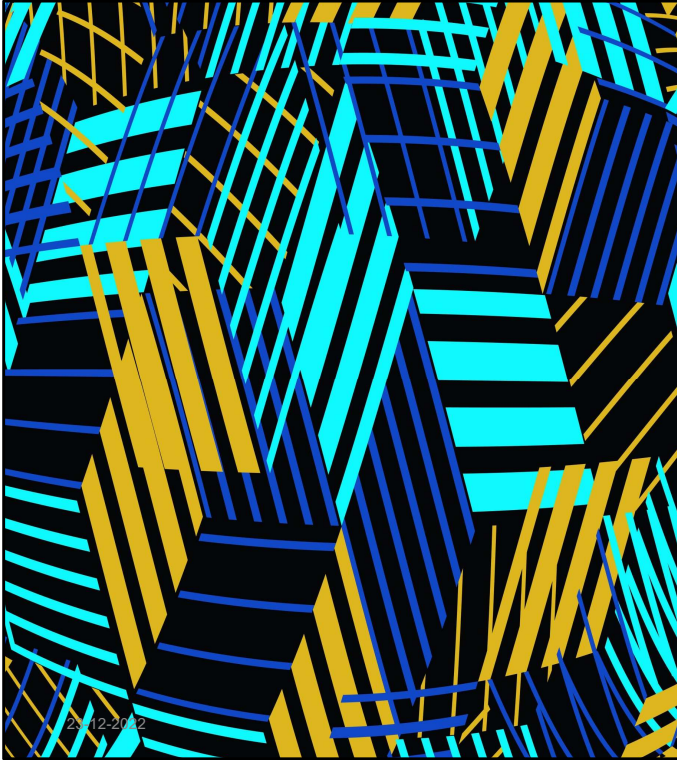
Choice of auditor (1)

'Who would you choose as your auditor?'

That is a great question, who would you pick?

Someone of you who would like to answer that?

Choice of auditor (2)

Table 2. Suggested Audit Table to Be Included in Studies That Have Performed an Audit Procedure.

Audit Characteristics	
Relation with the auditor[a]	Coauthor/internal/ external
Arguments supporting the auditor's expertise and independence	(open field)
Function of the audit	Formative[b]/ summative/both

De Kleijn, R., & Van Leeuwen, A. (2018). Reflections and review on the audit procedure: Guidelines for more transparency. *International Journal of Qualitative Methods*, *17*(1), 1609406918763214.

De Kleijn and Van Leeuwen have reflected and reviewed the audit procedure of Akkerman and others. They have come to the conclusion to propose two advices for researchers who use this procedure.

1. Think critically about the relationship between author and auditee, think about the expertise and the independence.
2. Think about the function of the audit: summative or formative

Choice of auditor (3)

- Independence of auditor
- Domain knowledge of topic at hand
- Example 1 Second author and daily supervisor
    Low in independence, high in knowledge
- Example 2: master's student educational sciences
    High in independence, low in domain kwowledge
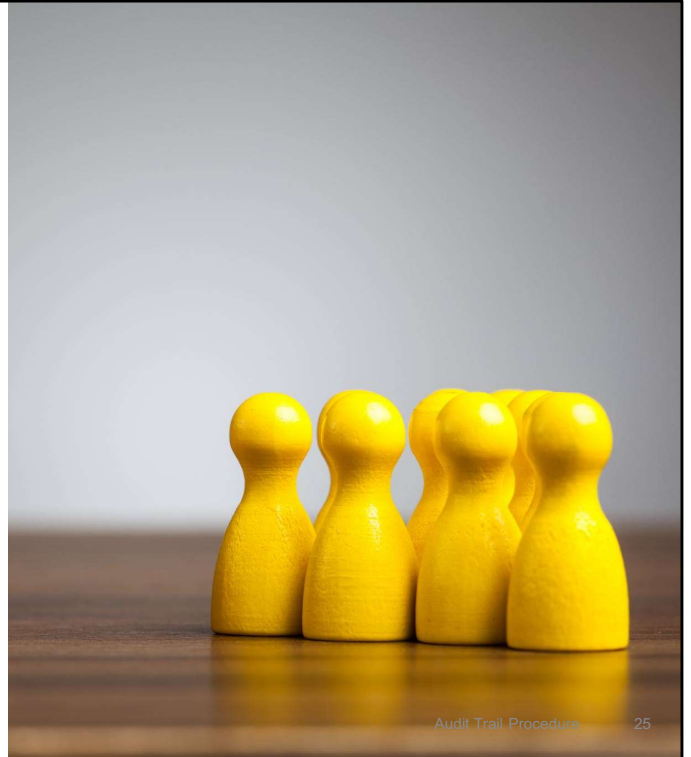
Audit trail components

Table II. Audit-trail components

Materials	Description
1. Start document	This document encompasses the problem, the conceptual framework or theoretical perspective, the (planned) methods and expected results, along with a reflection on the researcher position in the study.
2. Final document	Thesis, journal article, conference paper, report.
3. Raw data	Raw data and field notes. Raw materials often have to be made accessible to the auditor (e.g., taped conversations into written records, raw data with indexes or coding books).
4. Processed data	Processed data and memos. Raw data will often be processed before the analyses (coded records, summaries, annotated records and journals, statistical results, etc.).
5. Process document	This document covers a systematic report on the data gathering and data analysis, in terms of the actions undertaken and the associated results.

Akkerman et al. (2008)

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The procedure itself. Akkerman and others have proposed 5 specific steps

Preparing audit trail
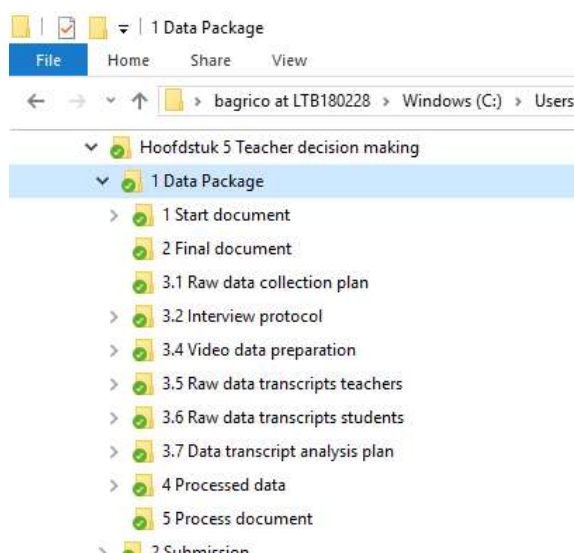
And in fact these steps are not only needed for an audit trail, it really comes in hand for your data management, to secure all the steps you have taken. The only difference is I have asked someone to assess these steps.

In the next slides I will provide several examples of proof I have provided to the auditor

1. Start (a): interview guides

3. Post-active phase: In-the-moment decisions and teaching actions

1. What happens here? *(teaching action)*
2. Can you please walk me through the teaching situation in which you carry out this action? *(teaching action)*
3. Can you describe what action you are performing here? *(teaching action)*
4. Can you tell me about the considerations in carrying out this teaching action? *(in-the-moment decision)*
5. Can you describe why you perform this teaching action? *(in-the-moment decision)*
6. Can you tell me about the decision that you have considered in carrying out this teaching action? *(in-the-moment decision)*
7. What did you think? *(in-the-moment decision)*
8. Where did your idea/assumption come from? *(in-the-moment decision)*
9. What happens with the student(s)?
10. What reaction did the student(s) give?
11. To what extent did you consider this teaching action earlier in the process? *(in-the-moment decision)*
12. What types of other actions went through your mind when you were in this situation? *(teaching action)*

Audit Trail Procedure

In step 1 the first example in the trail.

1. Start (b): transcription plan

The underlying transcription rules

1. Transcribe literally – do not summarize, but do not transcribe phonetically. Dialect and colloquial language are to be accurately translated into standard language. If there is no suitable translation for a word or expression, the dialect or colloquial language is retained. We presently provide transcription services (German only). The collaboration with our 40 typists further informed the development of the following transcription system.

2. "Merged" words are not transcribed as such, but approximated to standard written language. For instance: "I'm-a-goin' to the movies" is transcribed as "I am going to the movies". The general construction of a proposition is retained, even if it contains syntactic "errors", for example: "To the shopping mall I went."

3. Discontinuation of sentences or abrupt stops within a word are indicated by a slash: /

4. etc…..

Another example are the transcription rules

2. Final document (a): data collection

	1	2	3	4
Phase	Pre-active planning	Interactive teaching	Post-active	Post-active
Participant	Teacher	Teacher-student	Teacher	Student
Instrument	Interview	Observation supervision meeting	Stimulated recall interview	Stimulated recall interview
Materials	Fixed camera	Fixed and head mounted camera	Fixed camera	Fixed camera
Stimulus			Videotaped observation (head mounted)	Videotaped Observation (fixed camera)
Measures	Teacher's aims, objectives, and planning of teaching actions	Teacher's teaching actions	Teacher's in-the-moment decisions and teaching actions	Student's feedback perception

In step 2 the final document, you provide the manuscript you want to submit at a journal, but in my case also the four different phases of the data collection were provided. An interview phase, an observation phase and two stimulated recall phases.

2. Final document (b): data preparation

Transcripts

Four different transcripts were prepared: (1) the pre-active interview; (2) the supervision meeting; (3) the supervisor SRI; and (4) the student SRI. The videos were transcribed verbatim into simple transcripts: literally, with punctuation, pauses, continuers (e.g., hm, yeah), and turn taking, but without intonation or non-verbal behaviour. In each transcript, a speaker received his/her own paragraph and a blank line was used between speakers. Speech turn taking was used as a segmentation criterion, because it fits with the natural course of the conversation (Chi, 1997).

In the final document it was clear how many transcripts were made, and how they were written down.

3. Raw data (a)
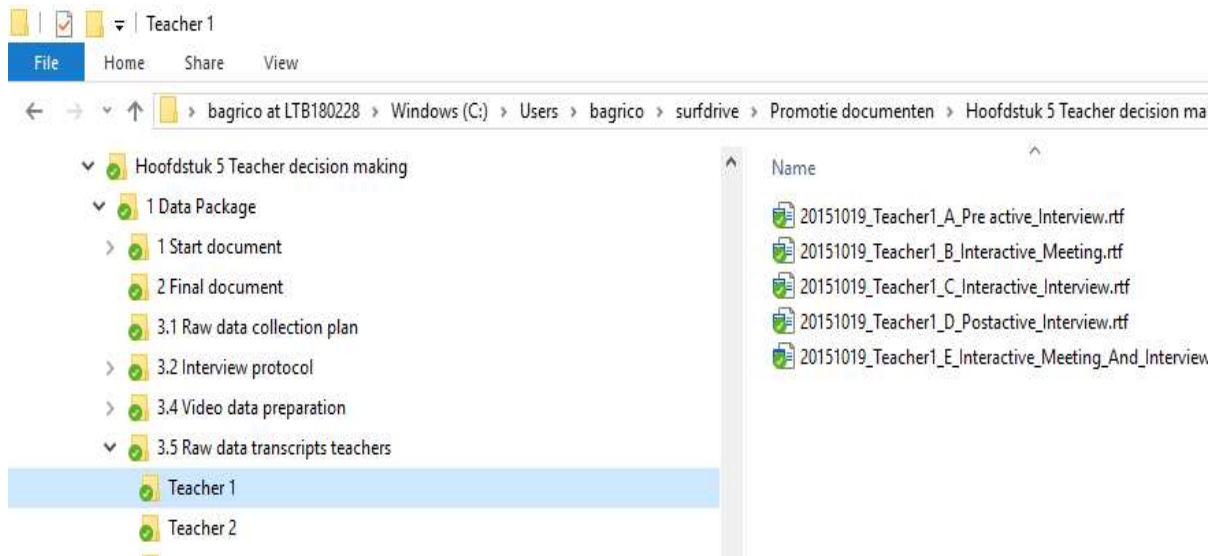
Audit Trail Procedure

Off course we provided the raw data, in this case all interview transcripts.

3. Raw data (b)

	Phase 1 Pre active interview	Phase 2 Interactive meeting	Phase 3 SR interview	Phase 4 Post active interview
Case 1				
Teacher 1	7 min	39 min	37 min	5 min
Case 2				
Teacher 2	7 min	38 min	30 min	3 min
Case 3				
Teacher 3	6 min	45 min	47 min (t/m min 14)	5 min
Student 1	7 min	45 min	39 min (t/m min 14)	10 min
Case 4				
Teacher 4	6 min	39 min	57 min (t/m min 14)	6 min
Student 2	7 min	39 min	41 min (t/m min 12)	6 min
Case 5				
Teacher 5	8 min	32 min	57 min (t/m min 17)	6 min
Student 3	8 min	32 min	43 min (t/m min 16)	7 min
Case 6				
Teacher 6	10 min	42 min	49 min (t/m 14 min)	8 min
Student 4	9 min	42 min	42 min (t/m min 16)	5 min
Student 5	9 min	42 min	33 min (t/m min 13)	3 min
Case 7				
Teacher 7	10 min	40 min	35 min (t/m 13 min)	5 min
Student 6	9 min	40 min	47 min (t/m 18 min)	7 min

Audit Trail Procedure

And we provided an overview of all data collected.

4. Processed data (a): Nvivo analyses
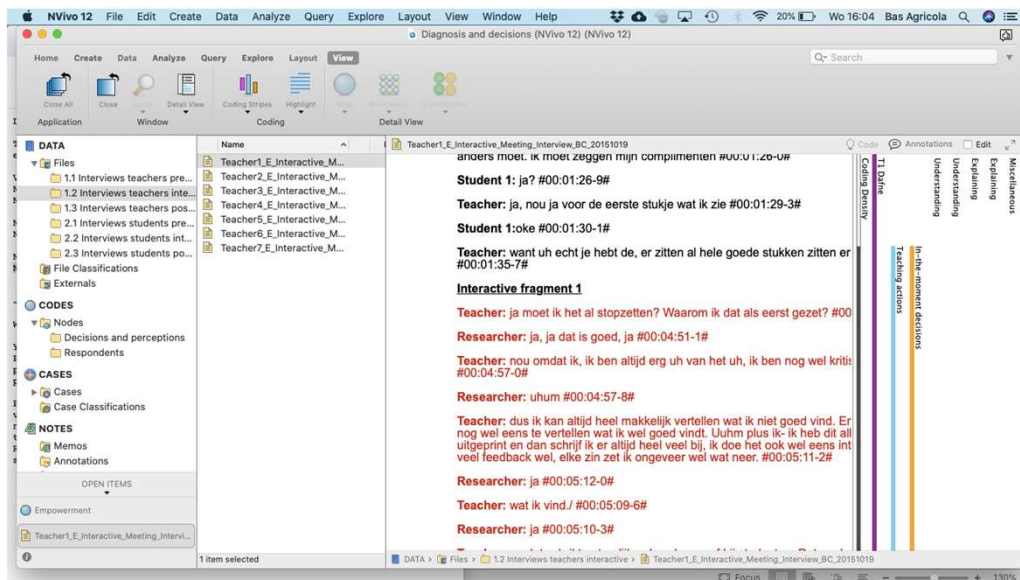
I provided the Nvivo file in which the coding was done.

4. Processed data (b): Codebook

In-the-moment decisions	Teacher recalls performing a teaching action giving consideration to:
Empowerment	giving students control in the conversation
Encouragement	stimulating students to continue, e.g. their line of reasoning
Instructional management	managing teachers' instructional flow of the meeting
Checking understanding	assessing students' knowledge about a concept, or procedure
Gathering information	gathering information about students' knowledge
Initiating new topic	initiating a new topic
Planning next step	thinking how to introduce the next step
Involvement	engaging students' participation and attention
Social needs	addressing social needs
Emotions	students' emotions, e.g. frustration or happiness
Expectations	students' expectations
Motivation	students' motivation
Understanding	increasing students' knowledge about a concept, or procedure

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As well as the finalized code books for the teacher data and student data

5. Process document

Januar 29th 2015

I have conducted a pilot stimulated recall interview. I had made a procedure and showed it the teacher. The procedure was clear to her.

Furthermore, I am quite satisfied with the interview, the teacher provided a lot of reactions on the supervision meeting she saw of herself with the students. Unfortunately she repeatedly looked at me during the interview, instead to the screen, as a result it became more of a conversation with me about the supervision meeting.

I have tried not to direct her in anyway, but to be merely interested in her thoughts during the meeting with the students. The interview took place directly after the supervision meeting.

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Finally I uploaded a process document, some kind of a log book, with all my thoughts about the study, before and during data collection and data analysis.

Audit procedure

- Stage 1   Orientation to audit procedure
- Stage 2   Orientation to study
- Stage 3   Determination of the auditability of the study
- Stage 4   Negotiation of the contract
- Stage 5   Assessment
- Stage 6   Renegotiation
- Stage 7   Final auditor report

These are really strict stages, in practice it was more relaxed.

Formative or summative

Audit Trail

To ensure the quality of this study, an audit trail was created (Akkerman et al., 2008). The object of this validation procedure was focused on all the steps of the data gathering and analysis. The auditor verified the research design, the procedure for data gathering and data analysis according to three criteria: visibility, comprehensibility, and acceptability. The first author prepared the procedure and presented all the findings to the auditor, accompanied by a justification of all decisions made. The second author acted as the auditor and conducted a summative audit. This type of audit meant the judgment of the auditor could not be used to improve the study, but merely aimed at validating the results that were reported (de Kleijn & Van Leeuwen, 2018). The auditor reported on the strengths and limitations and gave input to realize a more transparent method section (see Appendix E).

Visibility reported by auditor

'All steps of the data gathering process were clearly described in the final draft of the article. It was clear to me how the stimulated recall procedure was executed.'

Teacher SRI. An SRI was conducted with each supervisor immediately after the supervision meeting. The first 15 min of the supervision meeting were used as a stimulus. The videotape of the head-mounted camera was replayed to enable the supervisor to recollect and report on their supervising actions and recollect their in-the-moment decisions on which the actions were based (see Figure 3).

Comprehensibility reported by auditor

'There hasn't been made a systematic connection between teaching actions on the one hand and the student's perceptions on the other, that is, in a matrix. That required extra coding in NVivo.

The choice that has been made in this study is to connect teaching actions and student's perceptions more qualitatively, which will perhaps reveal more insight regarding the third research question.'

Acceptability reported by auditor

'The choice for the head-mounted camera is new in the field of education and may have led to a more accurate stimulated recall.'

Final remarks (1): Auditor's email

Hi Bas,

First of all a wonderful 2019 to you. This year, it is really going to happen, the defence of your PhD dissertation!

I have finally finished the audit trail. It was more work than I had foreseen, and I wanted to do it accurately, so sorry it took that long.

I have finally made some time for it in the holiday weeks and have taken a good inspection of the data package and linked it to the final document.

Final remark (2) Editor's comment

A. Comments of editor		
Reviewer's comment	Author's reaction	Author's action in the text
You use a lot of tables and appendix. Please shorten the number of tables and the appendix.	**We understand the editor's comment about the number of tables and appendices. In our effort to be fully transparent about the lesson study intervention at one hand and the coding process of the data on the other, we have submitted several tables and appendices.**	**We propose the following 6 deletions to shorten the number of tables, figures and appendices:** **…**

Final remarks (3) Reviewer comment

First, theme is very interesting and important, especially from the viewpoint of Teacher Education (TE). One of the challenges in TE is to develop students' capacity to reflect and understand "in-the-moment" decision making in teacher's work. All studies under this theme are offering new questions not only for science, but also for TE in practice.

Second, article is very good and coherent. Authors are focused their study well, and it is written very "reader-oriented" way, in other words, for reader, text as well as process of the study are easy to follow and review.

Third, research design is excellent and analysis of the study is done very convincingly (e.g. audit trail). Thus, my comments are mostly encouraging authors to think about their work from the viewpoints of latent meanings of phenomenon under study.

Questions?
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