

Methodological reflections of repeated interviews on teaching and learning mathematics

Helena Roos

Linnaeus University, Växjö Sweden

This paper is an exploration of what a qualitative method, interviews with students, can provide to mathematics education research and critical aspects important to take into consideration. In particular, if using repeated interviews with the same informants over time, what can be gained in relation to research quality? The argument made is that repeated interviews can provide with in depth knowledge and a grasp of students meaning(s). Critical aspects found were; person-dependency, objectivity, ethical considerations, an interview re-interview effect, and a connection between interview as a method and the aim of the study. These critical aspects are of importance to discuss and reflect upon all through the research process. If doing so, all these critical aspects can be used as a quality criterion when producing in depth knowledge in qualitative research.

Introduction

Qualitative research has become predominant in the research paradigm of mathematics education, which for instance can be seen in publications like *Approaches to Qualitative Research in Mathematics Education* (Bikner-Ahsbahr, Knipping & Presmeg, 2015). One of the most popular ways to conduct qualitative research is to conduct interviews (Zazkis & Hazzan, 1999). The main purpose of conducting an interview is to enter another person's way of making meaning in the world. Accordingly, the interview begins with the idea that the meanings of others are meaningful and can give us information and knowledge (Patton, 2002) about the world. Although, this idea is influenced by the worldview of the person(s) planning and executing the interview, and the entities or phenomena of focus in the investigation. Hence, it can be claimed that interview as a method is a "rather reflexive and critical endeavour" (Radford & Sabena, 2015, p. 178–179). From this way of looking at interviews it is important to consider that the interview essentially begins before the actual meeting with the informants, since the interviews are planned and reflected upon from a certain theoretical approach depending on the aim and research question of the current study (Grundén, 2017). Accordingly, it becomes important to be as transparent as possible when explaining the theoretical approach, and the links between the theoretical approach and the methodology. This becomes even more important in qualitative research, since the two parts, theory and methodology, are most often deeply intertwined in qualitative research in that sense that methodologies are often strongly grounded, or even arising from particular theories (Proulx & Maheux, 2016). If the link between theory and methodology becomes clear, and how the aim and research questions connect to the method, there can be a claim of high quality (Niss, 2010). In this paper, when looking at the method of interviews, it is thus important to be aware of the

link between theory and the way the interviews are conducted in relation to the aim of the current study.

When using interviews as a way of producing knowledge, different ways of using interviews can be chosen. This regards both the form of interview, but also the number of informants (Patton, 2002). Interviews are often made at one occasion with one informant, or a group of informants at one occasion. Another way to use interviews as a method is to choose to do repeated interviews with the same informants regarding a phenomenon over time, to try to frame themes in the answers over time (e.g Roos, 2019).

This brings us to the aim of this paper, which is to explore the qualitative method of repeated interviews in mathematics education research, and to methodological reflect on it from a quality perspective. The methodological reflection aim to cover both the planning of the interview and the actual process of interviewing. The research questions are; What can be gained by repeated interviews over time?; What critical aspects are important to take into consideration when using repeated interviews over time?

Views on interviews

Alvesson (2003) points out that there are several different views occurring in research regarding the interview as a research instrument. One view is a neopositivist view, where the context is put in the background and the focus is to create a context free objective and neutral truth. Here there is one reality, and it can be framed by a research protocol, where the researchers influence is minimized and the data from the interview becomes a channel to transfer knowledge (Alvesson, 2003). Another view is a romantic view, where the relation in the interview situation is of importance. Here this is a prerequisite to be able to frame the meaning of the informant. From this view interactivity in an interview brings honesty and a more realistic picture of the meaning of the informant. A third view presented by Alvesson (2003) is a localist view. Here the context is of importance and the interview is seen as an empirical situation, where talk is situated produced.

Interviews is used as a method in different research paradigms connected to a specific theoretical approach, such as for example connected to constructivist theories, socio cultural theories or social theories. If looking within the social paradigm, a discursive perspective on interviews can be taken. This perspective can be interpreted as having a localist view. From a discursive perspective the interview is a mean to identify and explore the participants' practices (Potter, 1996): "An interview can be a particularly effective way of getting at the range of interpretative repertoires that a participant has available as well as some of the uses to which those repertoires are put" (Potter, 1996, p. 15). As from the localist view, interviews from a discursive perspective do not occur in a complete vacuum but in interaction with the interviewer. In the interaction, the way the interviewer poses questions and acts in the interview situation influences the participants. This can be somewhat challenging, as the question-answer format might lead the participant to reflect on certain topics (Potter, 1996). In this article the focus will be the discursive perspective.

Possibilities and objections of interviews

Results from interviews being biased (Kvale, 1993), and the need for objectivity in research is common objections against interview as a method (Kilpatrick, 1993). One way to meet the critique of objectivity and bias in interviews is to be upfront with what actually can be biased in an interview, and describe how it may have affected the results (Kvale, 1993). Again, if taking a discursive perspective, this becomes crucial to do since the situation influences the participants in an interview situation (Potter, 1996).

Another critique against interviews as a method is that they are person-dependent, hence reproducibility is hard to reach (Kvale, 1993). This can also be debated, why is reproducibility important in a qualitative study such as an interview study? Instead Flyvbjerg (2011) argues that even though an interview study cannot be replicated, it is of importance since it is a part of the knowledge accumulation in relation to a certain topic, and thereby the findings can very well be transferable, even though not replicable. Hence, this opinion that if the study is not generalizable, then the study does not contribute to research development is contested. Interview studies can indeed be generalizable, depending on the case and how it is chosen, and the description of the casing, the force of example and transferability are underestimated (Flyvbjerg, 2011). If making yet another argument for interview studies, one might say that a chosen case reflects a subject of special interest that one seeks to understand (Stake, 1995). Accordingly, a detailed case study with interviews brings valuable knowledge to a study that goes in depth about what is being investigated and is important for a nuanced view of reality (Flyvbjerg, 2011). In addition to the nuanced view of reality that Flyvbjerg (2011) presents, Alvesson and Carreman (2000) highlights the idea of investigating the meaning of informants in interviews by highlighting durable and transient meaning. Alvesson and Carreman (2000) present durable meaning as something stable enough to wander between discourses, and transient meaning as something more unstable construed in the actual interview situation. This can be a discursive way of presenting reality. From a discursive way meaning arise in the space between people in interaction (e.g Gee, 2014). Then, as Grundén (2017) points out, it is of interest to interview the same informants on several occasions to be able to grasp both durable and transient meanings.

Ethical aspects of interviews

When using interviews as a method, an awareness of the complexity of using interviews in research, and the need to be vigilant to the informants (Alvesson, 2003) has to be present. In fact, ethics are present all through the research process, from creating the research question to writing the results and ethics is actually an important part of quality in research (Goodchild, 2011). Ethical considerations has to be made in every stage of the research process, and many questions often arises in relation to interviewing, such as: How will I get close to the informants? How can I do research with the informants, and how can they get a feeling of being a part of the research without feeling exposed? How can I grasp a process in the field and write it down without offending the informants, or the organisation? (Roos, 2019). Ethics is especially important when making interviews in the field. Here, the researcher needs to be aware of how to handle relations with informants, both professional and personal, as well as how to handle inside knowledge from the interviews, conflicting roles, and anonymity (Floyd & Arthur, 2012). It is also important to consider the power relations between the interviewer and the informant, especially if the informant is a child (Christensen, 2004), or a student. Hence, it is of

importance to consider social agency of the student, and active participation in research to be able to hear the meanings of the student (Christensen, 2004). Also, it is of importance to take the fine line between the rights of the students to be heard and the rights of the students to be protected in research into consideration (Alderson & Morrow, 2011).

An example of repeated interviews

In this section an example of repeated interviews is presented to show the methodological approach. This example is extracted from a discursive study by Roos (2019) where repeated interviews was used as a methodological approach when investigating students meaning(s) of inclusion in mathematics education.

In this study the same informants (6 students in a Swedish lower primary school, grade 7 and 8) were interviewed about their participation in teaching and learning mathematics in order to find a student perspective on inclusion in mathematics education. The school had set out to work inclusively, meaning its aim is to include all students in the ordinary classroom teaching in every subject and to incorporate special education into the ordinary teaching with no fixed special educational groups: “Inclusion is a core issue for us, everybody is welcome in the classroom. [...] The support will primarily take place within the classrooms by co-teaching between the teachers and special teachers” (from the school’s website, own translation).

The students (informants) were interviewed 5-6 times each during a semester. Every interview were preceded by a close in time observation of a mathematics lesson where the informant in question participated. The interviews were based on questions about teaching and learning in relation to the observed lesson, with pictures of tasks on the blackboard, or tasks in the book as support for the memory. Also questions regarding situations in the classroom, such as teachers explanations, discussions, groupings, help from the special teacher in mathematics¹ etc. were posed. By being mindful when posing questions, there was a reflection about not to impose own categories and constructions on the students. Also, this was one of the reasons for repeated interviews. By having several interview sessions with the students over time, a reflection could be made regarding the posing of the questions in each interview. Additionally, this implied that the students got a chance to get to know the interview situation and the interviewer, and thus became increasingly more secure and willing to answer and elaborate on questions without the interviewer leading to specific topics.

During the time spend in the field there was an important research process taking place between the interviews. Before the next interview with the same student was conducted, the prior interview were listened to and transcribed as far as possible. This to be able to reflect on the posing of questions, and to reflect on the questions and answers in relation to the aim and research questions of the study. Here, over time it was noticed that not only the answers of the student got fuller, also new aspects on their participation in the teaching

¹ A special teacher in mathematics worked at the school were the informants were enrolled. The special teacher is a teacher who is specialized in SEM (the special teacher has 1.5 years additional training in SEM at an advanced level, which is studied. after the teaching degree and in general at least, three years of working in the profession).

and learning got visible in the third and fourth interview. One example of this is when a student in grade 8 called Edward, in the fourth interview told the interviewer during a discussion about how he thinks in mathematics, that he has synesthesia:

Edward: I don't know if you have heard of it, but it is synesthesia.

interviewer: No, I haven't.

Edward: It is when you see numbers and letters in different colors in the head. So I have several senses connecting and helping me remember.

In the fifth interview Edward got back to discussing synesthesia, and said:

Edward: I think I use it all the time, since it helps me remember. I never have to sit down and repeat stuff, if I don't remember, I just use the colors automatically, and then I have it.

During the three first interviews Edward had talked about that he easy remembers stuff and that he thinks in a certain way, which does not always "fit" with the way the tasks are supposed to be solved. Though, he had never during these interviews talked about synesthesia. Hence, it seemed to be of importance to him that he knew the interviewer, and kind of trusted the interviewer before he revealed that information.

Methodological reflections of repeated interviews

If looking at the example above in relation to a localist view on interviews (Alvesson, 2003) we can see that the context is of importance, and that the situated talk in the interview is person-dependent. This can be interpreted as a threat to objectivity and there can be a claim that the result of an interview is hence biased (Kilpatrick, 1993). Though, as shown in the above example, and as highlighted by Flyvbjerg (2011), these person-dependent situations, which repeated interviews can be regarded as, helped to find in depth knowledge in a specific case, and brought valuable knowledge to the study. By this knowledge a nuanced view of reality from Edwards perspective could be provided. Hence, objectivity might not be a valuable measure if having a localist view in interviews and a person-dependency can actually be a positive thing if connecting it to repeated interviews.

The interview situations and the talk produced in the interview can be seen as situated, hence the knowledge of meanings that can be drawn will be somewhat transient, or unstable. In the above example though, since there were several interviews with the same informant (student in the above example), meanings wandering between the different interviews were visible, indicating a form of durable meaning. In the above case it was the meaning of remembering procedures and using the memory and colours (synesthesia) as a way to understand mathematics.

A critical aspect when conducting (repeated) interviews is ethical considerations. Being aware and vigilant to the informants, letting the fact that they got to know me as an interviewer became a positive thing indulging them to speak their meanings. In the example above this was seen by the recognition of the students getting increasingly more secure and willing to answer and elaborate on questions without the interviewer leading

to specific topics. Though, it can also be a negative thing, if the fact that they get to know the interviewer, make them try to fit their answers into what they think the interviewer want them to say. Accordingly, there is a fine line between being “professionally friendly” as a researcher with ethical considerations towards the informants, and being “too friendly”. In relation to this power relations between the interviewer and the informant need to be considered, especially if the informant is a child (Christensen, 2004). Another ethical aspect is the importance to consider the fine line between the rights of the students to be heard, and the rights of the students to be protected in research (Alderson & Morrow, 2011). One can claim that, with repeated interviews, this fine line can be recognised and reflected upon, both in and between interviews. This since there is time and space to reflect on these ethical issues and the students can choose to reclaim statements between interviews.

One aspect of quality is to strongly connect research questions and aim to the method (Niss, 2010). In the example above, one can claim that the quality from this perspective is enhanced by using repeated interviews, because of the reflection of connection to the aim and research questions made between interviews. This reflection made it possible to reflect on posed questions, and repose them with a slightly other angle the next time, to be able to come closer to the aim and research questions of the study. However, when reposing questions, there can be what is called in quantitative research, a test re-test effect. This effect mean that by doing the same test over again, the test taker can “learn” the test which is claimed to be negative. A common way to take this into consideration it to include a baseline with exposure to the test one time before. The aim is for the participants to familiarize with the test to reduce the test-re-test effect. If comparing this to the qualitative method of repeated interviews as in the above example, you could talk about an interview-re-interview effect. Though, in this case, the re-interview effect might be positive since the fact that the informants get to know the interviewer might strengthen the results. Also, if conducting more than two interviews with somewhat the same questions, a kind of qualitative baseline can be claimed.

Summing up, critical aspects when using repeated interviews as a method are; person-dependency, objectivity, ethical considerations, an interview re-interview effect, and a connection between interview as a method and the aim of the study. These critical aspects are of importance to discuss and reflect upon, both before entering the field, being in the field and when writing up the results. If doing so, all these critical aspects can be used as a quality criterion when producing in depth knowledge in qualitative research. These aspects can also be helpful in the interview process of producing knowledge in depth, with both transient and durable meaning(s) covered. This can be regarded as a main gains of conducting repeated interviews over time.

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