Unstructured Interview and Biography: which one is more beneficial to investigate the Process of Teaching and Learning Mathematics

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Abstract:
This paper has aimed to investigate tow of the qualitative research data collection methods: namely, unstructured interview and biography. Each approach of them has had its benefits and drawbacks. The review suggests that both unstructured interview and biography are suitable to collect sensitive and personal information. It also suggests that This information can be used to find out the difficulties in teaching and learning, and for depth understanding it is suggested the integration of both of unstructured interview and biography would be better.

Key words: *unstructured interview, biography, mathematics education research, qualitative method*

I.   Introduction:

Countless researchers use qualitative research to gain a greater understanding of social and educational issues. Besides, not every social and educational problem can employ quantitative research. Qualitative research is frequently employed to answer the whys and how's of human conduct and beliefs, and experience knowledge that is challenging to obtain by way of quantitative research (Guest et al., 2013). Denzin and Lincoln (2005, p3) defined qualitative research as 'a situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that makes the world visible. These practices transform the world. They turn the world into a series of representations, including field notes, interviews, conversations, photographs, recordings, and memos to the self. At this level, qualitative research involves an interpretive, naturalistic approach to the world. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or to interpret, phenomena in terms of the meanings people bring to them'. Therefore, qualitative research methods can be employed to explore why the phenomena under investigation occur and how it occurs. This implies that researchers in the field of mathematics education can utilise qualitative research methods to examine mathematics teaching and learning processes inside the classroom. Since the teaching process and difficulty of teaching and learning mathematics require collecting personal information, unstructured interviews and biographies can be suitable for collecting personal data (Johnson, 2001). Therefore, to explore the differences between a biography and an unstructured interview as a qualitative data collection method in mathematics education research, I will undertake a brief review of the biography and unstructured interview. After that, based on the practical experience in this module and the brief review they will be compared and evaluated.

Unstructured interview (USI)

The unstructured interview, in-depth or open-ended is a significant data collection method applied in qualitative research. It can provide greater breadth than other types given its qualitative nature (Fontana and Frey, 2005). The USI aims to acquire data to understand the language, culture and complex conduct of members of society without imposing any a priori classification, which might restrict the field of inquiry (Johnson, 2001; Punch, 2014; Silverman, 2011). Minichiello et al. (1990), defined the USI as an interview in which neither the question nor the response classifications are prearranged. Instead, they are based on social collaboration between the interviewer and the interviewee. It is a style that promotes interviewees to offer extensive descriptions where interviewers encourage interviewees by means of questions and other verbal and non-verbal approaches, to generate elaborate and detailed answers (Rapley, 2013). Zhang and Wildemuth (2009), indicated that there is no agreement on the definition of the USI, however, there is more agreement on the basic features of the USI. The interviewer comes to the interview without a predefined theoretical frame; hence, he/she has no assumptions and questions regarding the social reality under study. The interviewer has conversations with interviewees and creates questions in reaction to the interviewees' description. As a result, each USI might

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create data with different structures and patterns. The objective of the USI is to expose the interviewer to unexpected issues and to support him or her to gain an enhanced understanding of the interviewees' social reality from the interviewees' opinions.

It should be noted that because the USI does not use prepared questions, it does not mean that it occurs randomly. Indeed, the interviewer cannot start the USI without detailed knowledge and preparation, if he or she hopes to achieve deep insights into interviewees' lives (Patton, 2002). The interviewer comes with a clear idea that he or she always keeps in his or her mind, and allows interviewees to express themselves in their own terms by using minimum control over their responses (Bernard, 2011). However, the interviewer will attempt to encourage the interviewees to relate experiences and viewpoints that are relevant to the issues of curiosity to the research questions (Zhang and Wildemuth, 2009).

In the USI, the interviewer builds his or her interview in collaboration with the interviewee. The interviewer begins the USI slowly with small talk explaining the purpose of the interview. Johnson (2001), suggested beginning the USI with simple planned questions which are intended to move quickly into the main issue of the interview. Subsequently, the interviewer follows the interviewees' talk and creates questions spontaneously depending on his or her reflections which emerge during the conversation. In addition, the interviewer can use a list of questions which is termed an aide memoire or agenda to remind them of areas into which to lead the conversation, or a single question can be used to begin the interview, where the interviewee is encouraged to embark on his/her dialogue (Zhang and Wildemuth, 2009; Edwards and Holland, 2013).

For instance, when a researcher conducts an interview with a participant, they can chat informally in the beginning. After that, the researcher asks the participant an open-ended question, then let him answer it without any interruptions. However, while the participant is talking the researcher listen and interact with him using non-verbal cues, such as ahh, hmm, oh, and so on, to encourage him to expand on his answers. By means of his dialogue, other questions can be generated. Thus, the participant would be able to reply and develop his answer in detail. Dornyei (2007), stresses that if the interviewers follow interesting developments related to the interviewees' responses, they will elaborate on diverse issues.

The USI can be used for studying a range issues and is an extremely appropriate method to use in qualitative research, life story research, understanding language and culture, oral histories, and the collection of exceedingly personal information such as life experiences, occupational ideology, plus, cultural knowledge or perspectives (Silverman, 2011; Johnson, 2001; Fontana and Frey, 2005). Additionally, Bernard (2011), suggests that the USI can be used to study sensitive issues such as conflict, due to the fact that the open-ended and flexible questions are potentially able to obtain a more considered response, and hence, can provide better access to interviewees' thoughts, understandings and interpretation of events, experiences and ideas (Silverman, 2011).

It is important to state that the USI has a positive and a negative side. The main advantage of the USI is flexibility which allows the interviewer to respond to the interviewee and trace the meaning of the conversation. Furthermore, the interviewer has an opportunity to check his understanding, ask for more clarification and drill down into the issue in more detail, and thus find appropriate answers. Consequently, precise data can be obtained. In addition, the interviewer and the interviewee can establish a rapport because of the flexibility and the sense of freedom when the interviewee is talking. Additionally, the interaction can build an excellent relationship, which may continue throughout the research (Edwards and Holland, 2013; Silverman, 2011; Johnson, 2001; Fontana and Frey, 2005; Bernard, 2011; Alshenqeeti, 2014; Qu and Dumay, 2011).

In contrast, one of the significant disadvantages of the USI is the considerable amount of time it requires to gather data. Furthermore, it takes time to gain interviewees trust, develop a rapport and gain access to them, while it is a highly individualized method (Zhang and Wildemuth, 2009). Moreover, Zhang and Wildemuth (2009) and Silverman (2011), argued that the USI necessitates a skillful interviewer who is a flexible, active listener, able to build relationships with the interviewees, ask open-ended questions and make decisions about when and how to interrupt the conversation appropriately. Furthermore, the interviewer must be able to return it to a topic of curiosity for the purposes of research, especially when a new issue appears in the discussion. It is also challenging for the interviewer to recognise whether to follow it and threat losing continuity, or to stay on the principal theme and risk missing additional valuable information (Patton, 2002). This highlights the difficulty of controlling the degree of directness of the questions and statements proposed during the interview (Zhang and Wildemuth, 2009). In addition, one of the main drawbacks is analysing the data collected by the USI, as the questions asked in every single USI are dependent on the context of the conversation. As a result, different data will be generated which requires considerable effort and concentration to analyse the data methodically, and find the existing patterns (Patton, 2002).

Biography

The biography is one of the most important qualitative data collection methods. It can be described as personal or human documents. Roberts (2002), described the biographical method as research which uses

people's novels and other personal materials to comprehend an individual's life within their social situation. It permits researchers to study people, the relationships between them, understanding the changing experiences and attitudes in their everyday lives, what is significant from their point of view, and how to provide explanations of accounts provided of the past, present and future (Roberts, 2002; Clarke, 2001; Hawkins et al., 2016). In addition, the biographical method has the value of assisting the task of understanding major social changes by including how new experiences are interpreted by people within families, small groups and organisations (Roberts, 2002). Miller (2000), stresses that the aim of the collective biography is to gain a comprehensive understanding of individual's lives by way of reflecting on the wider cultural meaning of society. These are the reasons why many researchers of different topics have been attracted to the biography as a qualitative approach for dealing with social, political, cultural, psychological and educational issues.

The collective biography has been commonly employed in education research. It has covered a range of themes such as teaching experience, teachers' careers and lives, education history, the acquisition of pedagogical knowledge and adult learning (Roberts, 2002). For example, Biography can be used when a researcher conducts a study to investigate mathematical learning difficulties, or to explore to what extent students are satisfied with teaching methods being used. In this case, each one of them writes his/her biography expressing their opinions about the main topic. Dickinson (1998), confirmed that the biography is worth employing when studying learning difficulties and how to deal with them, when he conducted his research to study parents of people with learning difficulties.

Despite using biographical data collection between disciplines, disadvantages remain. Each biography will be written individually; therefore. each one will reveal different issues. Therefore, a significant amount of data produces challenges regarding analysis, in particular when the biography is linked to experiences in the past and present (Roberts, 2002). In addition, one of the principal issues is a lack of information due to memory errors, which means that some events may be overlooked because they have not been stored in the long-term memory (Huber et al., 2017). Coffey (2001) and Roberts (2002), highlighted the possible impact of romanticising individual biographies and the probability of missing social contexts and developments by concentrating too much on the individual and the personal by distinguishing certain voices and lives. They claimed that this could lead to the lives and voices of other being disregarded. Furthermore, I think the researcher may lose his opportunity to seek clarification and explanation from biographers, which might lead to data not being completely understood and/or misinterpreted.

In contrast, using the biography in research can generate several benefits. One of the significant advantages is that it allows participants the freedom to express their options and personal experience freely without any restrictions. Thus, it provides comprehensive details that assist with understanding everyday lives and the relationships between people. In addition, the biography permits researchers to obtain complex and sensitive information related to daily life and life's structure, while it is also effective in providing details where information is limited and theorisation is complex, which helps comprehension. Furthermore, it ensures that researchers will treat the backgrounds and experiences of the individuals involved seriously and that they are grounded in their social, cultural and historical contexts. Finally, the biography delivers considerable amounts of data that can open the door to further research in the future (Erben, 1998; Roberts, 2002; Campbell, 1997; Huber at el., 2017; Coffey, 2001; Clarke, 2001).

Comparison of the Unstructured interview (USI) and the Biography
Here, I will discuss the similarities and differences between the biography and USI. It is important to note firstly that both are quantitative data collection methods which provide flexibility for participants involved in research. Hence, they allow them to express their ideas and thoughts freely without interruption, which means that participants can elaborate on their answers. However, an advantage of the USI is that it offers the interviewer the flexibility to be involved in the interview and ask for explanations and clarifications of specific areas and subsequently, a greater understanding of the phenomenon under study. As a result, the USI provides more details than the biography.

The biography and USI are open-ended methods. As I mentioned previously, both provide more details that may lead to numerous issues appearing and participants giving different information. Consequently, they generate a huge amount of data which leads to analytical issues because each USI has different questions based on the context, whereas each biography can comprise dissimilar issues that lead to coding difficulties and moreover, challenges in analysing and finding patterns within them. In contrast, the vast amount of data requires further research in the future by re-examining the USI or biography from a different perspective.
It should be mentioned that the USI can help researchers and participants to form relationships. It is important for the interviewer to develop a rapport with the interviewee (DiCicco-Bloom & Crabtree, 2006), which can allow them to obtain more personal and sensitive information. As a result, in relation to the USI the researcher requires the skills to deal with participants, acquire their trust and control the interview, and subsequently, obtain more details. Whereas, regarding the biography the researcher cannot build a relationship with the

participants because biographers write individual biographies, and hence, there is no need to build a relationship with them. Conversely, this can be a positive point in terms of the research being unbiased, given that the researcher cannot influence the participants. However, it can be negative if the participants went away from answering the research question, they cannot be returned or directed back to the research topic. Conversely, the researchers may impact interviewers to get specific answers.

II.   Conclusion

This paper has illustrated the USI and biography as qualitative data collection methods and discussed the differences between them. The USI is defined as a style of interview based on social interaction between the interviewer and interviewee who are encouraged via questioning and other verbal and non-verbal methods. Additionally, no questions are prepared, and no answers classified (Minichiello et al., 1990; Rapley, 2013). The main advantages of the USI is providing a greater understanding of the issue under study by means of interaction between the interviewer and interviewee, although the USI requires a great deal of effort to analyse the data within it. In contrast, Roberts (2002), defined the biography as a research method which employs stories of people and other personal materials to understand an individual's life within its social context. The significant disadvantage of the biography is memory errors which lead to lack of information. Alternatively, it permits biographers to write what they want and express their thoughts and experiences concerning their daily lives, which can help in providing sensitive information (Roberts, 2002).

I believe that both methods can be used to study mathematics and education issues such as learning difficulties in mathematics, teaching problems and teachers' training needs. Nevertheless, I suggest that these methods are combined to obtain a greater understanding and to avoid the weaknesses found in each method. For instance, if a researcher wants to study teaching problems pertaining to mathematics, he would initially ask participants to write a biography talking about their experiences of teaching mathematics. Subsequently, he would conduct USIs with them to gather more information on their teaching experience. This can help to ascertain a degree of credibility and avoid a lack of information and memory errors, whilst moreover, accuracy will be enhanced. It is believed that the USI and biography are open-ended methods which are suitable for studying many educational issues, and can provide a more comprehensive understanding and knowledge when they are combined to investigate phenomenon.

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