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APPEARANCE OF TRIANGULATION IN TEACHER TRAINEES' RESEARCH PLANS

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Abstract. This study investigates the emergence of triangulation in teacher trainees' research plans. The main objective of the research is to detect the inappropriate uses of triangulation to point out didactic aspects that can promote the efficiency of educators teaching research methodology. Participants in research methodology courses had to design and document a research process related to school or teaching in the form of a research plan. They had a free choice regarding the topic of the research. The coding of the text corpora amounting to 400 pages was done by combining deductive and inductive logic. The reliability of coding was ensured by intracoding. The results show that inappropriate uses of triangulation can be described as misuse of terminology, false equivalence of triangulation and methodological triangulation, and false equivalence of triangulation and mixed methods. The problems encountered have a double feedback function. First, they give feedback for the academic course, second, after drawing the conclusions they also serve as self-reflection to form education activities and thinking.

Keywords: qualitative analysis; research plans; teacher training; triangulation

Introduction

When studying the professionalization process of a teacher's work, special attention is given to the steps of becoming a teacher-researcher, currently the highest position available in the Hungarian state education system. The foundations of this process are laid as early as in teacher training, since teacher trainees take part in obligatory research methodology courses, where they gain information about designing and doing pedagogical research. While planning and executing a pedagogical research special attention should be given to triangulation that ensures the multi-dimensional nature of research. Triangulation is often used in qualitative empirical studies (Flick, 2008, 2014) hence a summary of types of triangulation is outlined here to support the explanation of the research plans created by teacher trainees.

Theoretical Background

The technique of triangulation appears in the work of the great mathematician Carl Friedrich Gauss, who was commissioned with the task of making an accurate

survey of the land for military and taxing reasons in 1816 by the magistrates of Hannover. He carried out his measurements using the technique of triangulation, using a triangle of three mountain peaks as a basis, and then broadened the network to cover the whole territory of the country (Szénássy, 2004). The name "triangulation" can also be traced back to a triangle-shaped instrument, as farmers of old times used triangle-shaped instruments made of wood to survey their lands as accurately as possible. The technique of triangulation also helped navigation on seas and oceans and it was also used during the geodetic explorations of the 1950s. In our days it is used by reporters, military strategists, and navigators to create a trigonometric process that can accurately give the position of a living creature or an object by calculating the coordinates of a point (Sántha, 2015).

When analyzing the possible functions of triangulation in empirical research, it is important to take into consideration that qualitative research methodology uses the term triangulation metaphorically to create complex strategies to study the same phenomenon. In a broader context, according to a view which emphasizes the role of quantitative terminology in qualitative research, triangulation can be seen as one of the validators of qualitative research (Flick, 2008; Steinke, 2002).

With the appearance of Grounded Theory (Glaser & Strauss, 1967), and the research of Denzin (1989), more and more attention was given to triangulation in scientific communities. In the 1970s in processes in American and western-European social sciences which were using a combination of quantitative and qualitative methods, researchers used the terms mixed methods and triangulation interchangeably, without an effort to differentiate them (Ackel-Eisnach & Müller, 2012). The work of Lamnek (2005) and Flick (2008, 2014) greatly contributed to the elaboration of the theoretical and methodological basis of triangulation by emphasizing that triangulation is more than a combination of different methods.

This research uses triangulation typologies according to Denzin's interpretation (Denzin, 1989; Flick, 2008), making a distinction among the theoretical, methodological, investigator and data triangulation.

Theoretical triangulation advocates the use of as many theoretical concepts in a project as possible. All projects have different theoretical backgrounds, and the interaction of theories, finding relationships between them, or even rethinking them can be a motivator for further research.

Methodological triangulation is the central concept of triangulation typologies, and as such deserves a special attention in research paradigms. While applying it in the data gathering process, it is subservient to use as many methods as possible to investigate the same problem. Distinction can be made between "between method" or "across method", as well as "within method" triangulation. Triangulation between methods means a combination of two or more methods during the research, which can generate congruent, or comparable, data. Many researchers only mean this method when referring to or using triangulation techniques and Denzin (1989) also

sees this variety as the most significant of all. "Within method" triangulation means a combination of different techniques within the same method, and is the most useful when the different approaches within a method can be used systematically and they are theoretically well-founded.

Investigator triangulation is used to minimize the subjective influence that is inherently present in qualitative research by involving several researchers and analysts in the research process (especially in the stages of data collection and analysis). In other words, it advocates the study of the same phenomena by several different people as negotiating data and results with fellow researchers can contribute to the correction of theory, data interpretation, or of the whole process, thus encouraging generating theories.

According to a general approach, data triangulation means work with data collected in different times and places, from different sources and different people, and using different techniques. Thus distinction can be made among spatial, temporal, and personal dimensions, and work with a complex set of data is ensured this way.

Denzin's (1989) concept of multiple triangulation is a mixture of the elements of data, and of investigator, methodological, and theoretical triangulation, preferring the use of a variety of types within the same research project. A combination of these types ensures the possibility of several analyses from different perspectives.

Methodology of Research

This research was designed to reveal the modes of application of triangulation in teacher trainees' research plans and to detect occurrent misuse and misinterpretation of them. The outcome of this research might contribute to a better understanding of those didactic aspects that can promote the efficiency of educators teaching research methodology.

Sample of Research

The research of triangulation was based on the research plans made by full-time and correspondence teacher trainees at a university (N=102). The participants were selected by the so called comfort sampling method with which students could have been reached easily since all of them were taught by the author in the given academic year. However, comfort sampling can be problematic in qualitative research; in this case this was the only possible solution in regard to the available educators giving lectures on qualitative research methodology.

Triangulation was given a special role during the classes: beyond the classical "triangulation as a technique of validity" principle approaches focusing on the connections between triangulation and the multidimensionality of research was also discussed.

Ethical Parameters

In the qualitative research it was an important aim to build an appropriate relationship between the students and the researcher, which guarantees good

partnership that might result in positive outcome. All participants knew the task and their objectives, and during the research process anonymity was ensured.

Instrument and Procedures

Students had to design and document a research process related to school or teaching in the form of a research plans during research methodology courses. The students had the option to choose the topic of the research. The research plans were collected over a period of one semester during the academic year 2015/2016.

Implementation was helped by a list of aspects disclosed to the students, which contained the timing of the surveys, and the most important content nodes of the research plan. The list of aspects included the nature of scientific exploration, possibilities of structuring reality, choosing the research problem, reviewing literature, the research paradigms of quantitative, qualitative, and mixed methods, the question of hypotheses and initial questions and problems (theoretical openness), choosing the methods, sampling, methodological principles, data and their processing, ethical parameters, and the ways of presenting the results. The research plans were usually four pages long, so a 400-page text corpora was at hand for analysis.

Data Analysis

The processing of research plans was done combining deductive and inductive logic. The deductive coding logic enables a coding according to a list (a priori), so the code list included the terms "triangulation", "combined paradigm – mixed methods", and also "methodological principles". These three terms were used because they cover the context that can show the uses of triangulation in the research plans. Moreover, this makes possible the exploration of the students' theoretical and practical knowledge about triangulation, the mixed methods, and the methodological principles of research.

Following this, bigger text segments were assigned to the codes from the code list in accordance with their contents. This was followed by the further categorization of the text segments according to an inductive coding logic. The reliability of coding was ensured by intracoding (Dafinoiu & Lungu, 2003), i.e. the revision and re-coding of the text corpora after a couple of days. The two processes yielded exactly the same results, the reliability index of coding was the maximum 1.

Results and Discussion

From the 102 research plans studied 24 did not even mention the concept; however, 22 included some sort of a problem worthy of following up, involving triangulation.

The results can be categorized around three major content nodes. The results show it is worth investigating problems of language use and focusing on the false equivalence of triangulation and methodological triangulation, and the false equivalence of triangulation and the mixed methods.

Problems of language use, terminological shortcomings on the code list

When processing the research plans it was clearly seen that the terms fixed on the code list were unused in 24 of the research plans. This can be explained using several arguments. It is remarkable that the research plans lacking triangulation are mostly made in accordance with the quantitative principle, where it did not surface as markedly as in the research plans made up according to the qualitative or mixed paradigm in the thoughts of the students. We can clearly state this even though large sample studies also try to consider some sorts of triangulation. A good example of this is the Multitrait – Multimethod Matrix (MTMM) introduced by Campbell and Fiske (Campbell & Fiske, 1959). The matrix enables us to study how the different methods represent the same construction, and how the different traits can be studied using one single method (Bortz & Döring, 2003; Eid, Nussbeck & Lischetzke, 2006).

It is also to be noted that some of the research plans lacking triangulation include ones treating the history of education. This is a problem worthy of consideration as historical research in education sciences usually has traits that necessitates the use of triangulation in terms of research methods, data, or even data processors.

The false equivalence of triangulation and methodological triangulation

In one of the trains of thought that can be found in students' research plans triangulation seems equivalent to the concept of methodological triangulation (e.g. the use of two qualitative methods to investigate the same problem). The equivalence of triangulation and methodological triangulation is false as in this case since it is about a narrowing of the concept of triangulation and it is only methodological triangulation that is considered as useful in the research plans, even though the concept is more complex than that. In such cases there is a significant part of triangulation that is lost: the necessity and possibility of a manifold analysis taking multidimensionality into consideration, thus leading the researcher to a continuous reflection.

The false equivalence of triangulation and the mixed methods

There is another problem in the research plans that delineate triangulation as being equivalent to the mixed methods. In this case the emphasis is on the use of two different quantitative methods, but a focus on the possible combination of quantitative and qualitative methods (Creswell & Plano, 2011; Creswell, 2012).

How can this problem come about? First, the paradigm-independence of triangulation can be suspected, so the concept goes beyond the qualitative and quantitative paradigm and is used in mixed methods (Kuckartz, 2014). Second, the question arises whether a real, clear-cut borderline can be made between triangulation and mixed methods. A clear-cut borderline cannot be drawn, but at the level of definitions a distinction can be made. If triangulation is also interpreted as a tool of looking at data in different ways, it can also be stated that it is more complex than mixed methods and cares about the structure and practice of the research. When studying the differences between triangulation and mixed methods, Flick (2012) emphasizes

the comparison of different paradigms (mixed methods), and, instead of paradigms, the comparison of research perspectives (triangulation).

Conclusions

The discussed topic is important for teacher training and further training, as acquiring and developing research methodology skills is a very important step to become a teacher-researcher.

The proposed solutions to the problems encountered can be summarized in several ways. As a first step, it seems necessary to more efficiently synthesize the theoretical and practical aspects of the research methodology course, as it was difficult for many students in many areas – professional terminology, content nodes, mechanisms of data analysis. The tangible benefit of the course seems to come when writing theses, when working to become a researcher teacher, or during a Ph.D. course. Integrating computer-assisted qualitative data analysis into teacher training more effectively might also contribute to the solution of the problem, as most software that can analyze qualitative data can now also be used to work with Denzin's triangulation typologies.

Analyzing the problems delineated above has contributed to nuancing and deepening the discourse in research methodology courses in teacher training and education sciences, thus theoretical background and practice can move closer to each other.

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