

NETWORK CARDS AS A WAY OF DISCOVERING THE REFLECTIVE THINKING OF TEACHER TRAINEES: THE RELEVANCIES OF A QUALITATIVE ANALYSIS

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Abstract: In this paper we are going to analyse the reflections of teacher trainees about teaching activities with the help of ego-centred networks. The primary goal was to connect reflective thinking and the topics of ego-centred networks in a qualitative research. Second year teacher trainees ($N=25$) were asked to illustrate their ideas concerning teaching activities by means of the unstandardised network card method. The network cards were processed with the VennMaker software. Reflections about teaching activities were presented visually and students also explained the process of making their network cards in writing, therefore we also had text corpora (reflective diaries) to analyse, which were processed with MAXQDA software. The results are discussed on the basis of the reflections regarding the composition of networks, sectors, connections between notions, and positions of notions. On the basis of the results we can state that a structured, unstandardized network card helps the discovery of reflective approaches, even if only after minimal modifications.

Keywords: network card, ego-centred networks, reflective diaries, reflective thinking, qualitative research

1. Introduction

Network analysis has a prominent role in analysing the behaviour and personal attributes of people active in everyday pedagogy, as well as in analysing social phenomena. Sociology and psychology involve the analysis of mechanisms influencing personal relations and individual attributes, and all these bear relevant information for education sciences, too. The appearance of sociometry made it possible for pedagogy to perform the multi-faceted analysis of classroom relations, and can also give us substantial information when performing the analysis of classroom interactions.

Network analysis gives us a tool to systematically discover a specific network. The network is made up of sets of nodes and edges, which make up the connections between nodes. In scientific discourse, it is the quantitative method of network analysis that got into the focus, thanks to the easy quantifiability of network elements, as a network can be described as a countable set of nodes ($N=\{1,2,\dots, n\}$), the edges of which can be quantified as “1” if there is an edge, and as “0” if there is no edge (Jansen, 2003; Rehberg, 2015). We can see that formal network analysis is closely linked with graph theory as it gives a possibility to dichotomise the network structure (cf. the notations “0” and “1” for edges), and to represent the analysis visually in a graphic form.

Relations and nodes play a significant role in the quantifiable network structure, but in the present paper we are also making an attempt at illustrating aspects of the qualitative analysis of networks, as we are trying to discover the reflective thinking of teacher trainees using ego-centred networks. The goal is to connect the topic of reflective thinking with network analysis, especially the analysis of ego-centred networks.

2. Social Networks

Network analysis focuses on the systematic description of attributes of relationship patterns between network elements. This is done paying attention to structural dimensions at the same time. The term “social networks” is used as an umbrella term from now on, interpreted as a term which denotes the investigation of social relations and their structures, taking into consideration the fact that the structures are defined by the behaviour of the actors making up the social networks.

Today, there are several approaches in network analysis, the three most notable being macro-level, meso-level, and ego-centred networks (Feleky, 2012; Herz, Peters & Truschkat, 2015; Pléh, 2014; Rehberg, 2015).

A macro-level approach focuses on the understanding of the statistical attributes of networks, with the analysis of network elements in its centre (nodes, relationships), and it uses quantitative methods and complex calculations. During the study of macro-level networks, a well-defined set of participants is analysed, focusing on the relations between them. This, for example, enables us to study the social network of the pupils at a school.

Meso-level network analysis focuses on interaction and information transfer, doing analyses in a well-defined group, for example in a classroom or in a staffroom. This sociocentric approach discovers relationships and attributes only in a specific network, the results are thus valid only in that context. This methodological approach is basically different from macro-level approaches, as it does not enable the researcher to make conclusions of general validity.

Besides the two traditional approaches there is also a third one, which deals with the analysis of ego-centred networks, which focus on the characterisation of individuals and the analysis of specific cases. In network analysis, personal relations are known as ego-centred networks, which enable us to discover the social network that has developed around one particular person (ego, I) (Hollstein & Pfeffer, 2010; Jansen, 2003). In such a case, the focus shifts from sociocentric to ego-centric (Pléh, 2014). In the case of ego-centred networks, the analysis of one single person’s social network is carried out, if we speak about a school, it can be the relationship of the form master with parents, colleagues, superiors, or pupils. The ego-centred approach takes qualitative aspects into consideration, too, moreover, ego-centred network analysis can also combine both the quantitative and the qualitative approaches, as in quantifiable network structures relations and nodes play a significant role, the deep layers of which can be discovered using qualitative techniques (e.g. interviews, reflective diaries).

The analysis of ego-centred networks can be done on two levels, one is the network level, the other is the analysis of relations. On the network level, we can discover the size of the network and the frequency of the relations. On the level of relations, we can analyse the relations between the I and other network actors, in other words, by discovering the content of relations we can get a deeper understanding, moreover, the inclusion of background variables such as age and place of residence can provide even more information (Rehberg, 2015).

3. Methodological Background

A group of teacher trainees (N=25) were asked to illustrate their ideas concerning teaching activities by means of the structured unstandardised network card method. This technique is an improved method of the “hierarchical mapping technique” (Kahn & Antonucci, 1980), which is frequently used in the analysis of ego-centred networks. When using the hierarchical mapping technique, subjects of the test get a piece of paper with four concentric circles. In the innermost circle, the word “I” is written. The researcher asks participants to put the initials of persons who are important for them on the circles. With the help of this method, the space around the “I” is structured by concentric circles that illustrate emotional closeness and distance (Hollstein & Pfeffer, 2010).

In the following, based on the principles of the hierarchical mapping technique, it is worth answering the question what makes the network card structured but, at the same time, unstandardised. The concentric circles are present as a structuring element, but there is no fixed prescription concerning the number of circles. Another structuring element is the introduction of sectors, which serve as indicators to the main scenes of the “I” (e.g. family and work), and there is no prescribed number concerning the number of sectors (Hollstein & Pfeffer, 2010). The network card can be combined with interview types close to the inductive type of qualitative interviews (e.g. unstructured interview), in such a case, the production of the network card and the interview (comment) are parallel processes (Herz, Peters & Truschkat, 2015).

In our research, we modified the use of the structured unstandardised network card so as to make it the most suitable for discovering reflections, i.e. to make it possible to discover the reflections and beliefs of the person in focus concerning teaching activities (in this respect, there is a huge similarity between the cognitive map and the network card). Students therefore wrote the notion of “Teaching Activity” in the middle of the paper sheet, and then placed the notions concerning teaching activities relevant to them on the desired number of concentric circles. The visual representation of the structured unstandardised network cards was done with the VennMaker software. Reflections about teaching activities were presented visually and students also explained the process of making their network cards in writing, therefore we also had text corpora (reflective diaries) to analyse. The text corpora were processed using the MAXQDA software. This way we also found a link how the VennMaker and MAXQDA softwares can be used in the same qualitative project.

4. Data Analysis

The coding of text corpora was done combining deductive and inductive logic. The a priori coding according to a deductive coding logic was done on the basis of the list of notions displayed by students on concentric circles, while the discovery of the deep layers of text corpora, explaining the notions as well as putting them in a broader context, was done using inductive content analysis. In this process, we were looking for codes using the text as a starting point, and these codes were the subcodes of the main codes found during a priori coding. The reliability of the coding done during inductive content analysis was ensured through intracoding. The text corpora were recoded twice, the categories were completely identical.

It is food for thought that from the N=25 sample there were only N=7 network cards that contained as a coherent text the steps of making the card itself, or the explanation of the placing of different notions. All the other network cards contained no further explanation or only very little explanation, one or two-word comments; such cards were not processed further.

5. Results

5.1. Network Composition and Cohesion

We agree with Diaz-Bone’s (2007) suggestion that the qualitative techniques trying to evaluate network cards are currently formal and tend to focus on quantifiability, still, in table 1, we are going to present the numbers of circles and sectors, and the main content units of the circles. We are doing so because this information can facilitate the interpretation of text corpora.

Table 1. Circles and sectors in structured unstandardised network cards

	Cases (N)						
	1.	2.	3.	4.	5.	6.	7.
Number of circles	3	4	3	3	3	5(3)	4(3)
Number of sectors	3	2	3	2	2	3	4

The number of circles on the structured unstandardised network cards is similar, most teacher trainees used three concentric circles to represent the main motifs of their ideas concerning teaching activities. Cases 6 and 7 were different, here we found five and four circles on the network card, but notions were only written on three of them. In all likelihood, students drew the circles before doing the task and they filled them with notions afterwards, and they simply did not want to place any notions on the outer circles that are farther from “teaching activity”. There is another explanation, namely that the drawing of the circles was not planned carefully enough, so the teacher trainees did not want to (or were unable to?) name any other relevant notions that could have been placed on one of the farther circles. Unfortunately, the problem of the circles without notions is not explained in the comments of cases 6 and 7.

The number of sectors, similarly to the number of concentric circles, is also very similar, as the network cards of the teacher trainees gave an opportunity to define a minimum of two and a maximum of four sectors. Developing the sectors was facilitated by the commentaries appended to the cards. When developing the sectors, we made our decisions on the basis of the text corpus instead of the placement of the notions on the concentric circles. This means we put in one sector notions if we could detect causal relations between them during the text analysis (Table 2).

Table 2. Sectors and their main content nodes

Case (N)	Number of sectors	Main content nodes of sectors
1.	3	knowledge – assessment; setting an example – education – discussion of problems; connection – organisation
2.	2	teacher’s person; teaching
3.	3	teaching – interest – attention; education – moral values – preparation for life
4.	2	teacher’s person; teaching
5.	2	teaching; self-knowledge
6.	3	teacher’s person; teaching; connection
7.	4	teaching; education; research – continuing training; trends

To give an example of a detailed sector analysis, let us see the network card and sectors of Case 1 (the analysis of other cases can be done in a similar way).

The first sector can be formed around the nodes of giving and assessing knowledge, as one student said “It is important to present information precisely and clearly to pupils”, and “The pupils must get some sort of feedback about their work, otherwise they feel it has no sense and it is unnecessary.”

A connection can be assumed between sectors 1 and 2 (setting an example – education – discussion of problems), as talking to pupils and parents about problems also functions as a sort of feedback: “It is important that the teacher should speak about a problem with the pupil, but important questions concern the parents, too.” Furthermore, according to a student, education can be seen as “imparting moral values,” and “these values will also be authentic if they are reflected in the teacher’s behaviour (integrity) as well.”

According to the comments, sector 3 forms a separate unit, very little connection can be discovered between this and sectors 1 and 2. Along the “connection – organisation” axis we see references to community and extracurricular activities: “In primary and secondary school it is very important for young people to belong to a good community, the formation and maintenance of which requires the teacher’s help.” When speaking about extracurricular activities, one teacher trainee goes beyond the topic of community: “This is important not just because of community life, but also because of intellectual development. Many children would never make it to the theatre or go on a holiday or in a summer camp if the school did not make it possible.”

5.2. Connections, relations

On the basis of the sectors we can see that there are stronger relations between some regions on the card, for example we presented sectors 1 and 2 above, namely the connections between “knowledge – assessment” and “setting an example – education – discussion of problems.” After reading the commentaries on the network card, we cannot detect relations that destabilise the network, so in this respect, the reflective thinking of the teacher trainee is coherent. The relation between sectors 1 and 2 is strong, it stabilises the network. Multiple relations cannot be detected.

5.3. Statements about notions and their positions

In this section we examine which notions are in a similar position and why in the network. Here, it is very important to define what we mean when we say “similar position.” The network card was made using the concentric circles technique, which means that the central notion of “teaching activity” is surrounded by notions at various distances depending on the place of the notion on the different circles. According to the instructions given, the students put the notions they found to be closest related to the central notion on the first circle, so following the concentric circles from the inner to the outer ones we get to notions regarded as peripheral to the central notion.

The teacher trainee in Case 1 put the words “education,” “setting an example,” and “knowledge transfer” on the first circle of the network card, in this student’s opinion these are closest to teaching activities. Table 1 also shows the subcodes that help us interpret the deep layers of the notions placed on the first circle. According to the teacher trainee, the goal of education can be described as imparting moral values (unfortunately there is no explanation what this exactly means), setting an example can be described as the authentic behaviour (integrity) of the teacher, whereas knowledge transfer lies in precision and clarity.

The second circle of the network card contained the notions “assessment,” organising “extracurricular activities,” and “community.” As the student used only three circles, on the basis of the visual layout we can assume that these notions are of “medium importance” in relation to teaching activity. According to the information derived from the content analysis of the commentary added, assessment is necessary for pupils and has a feedback function for them, but the student does not mention any feedback functions for him/herself, the teacher, or the parent, so his/her analysis of the topic was slightly simplified. Extracurricular activities have a dual function, the teacher trainee thinks it is important in terms of community life and intellectual development. Forming and managing a community is a part of teaching, and sustaining a community is a challenging part of a teacher’s job.

On the third circle, there was only one notion, “regular contact with parents.” The network card and the text corpus presented this problem in two entirely different structures. After an inductive analysis of the text corpus we can see that the notion directly connected with teaching activity is “discussing problems,” of which one of the subcodes is “parents.” That is to say the teacher trainee thinks regular contact with parents is an important factor especially when problems must be discussed and handled. It is worth noting from a methodological point of view that the VennMaker and the MAXQDA softwares played a complementary role; only with using VennMaker we would not have found the supplementary information detailed above. VennMaker is a tool to analyse and visualise ego-centred networks, but, although it can be used to visualise notions connected to reflective thinking and beliefs, in itself it cannot be used to fully uncover the role of reflections in the teaching activity.

6. Summary

This paper has been an attempt to present a qualitative tool to investigate the reflective thinking and beliefs of teachers and teacher trainees. We can state that the structured unstandardised network card helps the discovery of reflective approaches, even if only after minimal modifications. We have also illustrated the possible link between MAXQDA and VennMaker, which help visualisation and quicken analysis, so we hope they will have an increasing role in education science research in the near future.

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