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Systemic Functional Linguistics as a methodological tool when researching Patterns of Participation

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This study highlights the role, if any, that teacher education programmes and experiences from other practices play in influencing generalist student teachers' tales of themselves as emergent primary mathematics teachers. The conceptual framework Patterns of Participation, PoP, is used when theorising and interpreting student teachers' becoming, and analysing the processual and dynamic character of immediate social interaction related to practice on a macro level. Therefore, this paper evaluates whether Systemic Functional Linguistics, SFL, can be a methodological tool used on the micro level. This paper shows that SFL structures the data in a way that makes interpretations through PoP possible.

Keywords: Methodology, Patterns of Participation, Systemic Functional Linguistics, teacher education, student teachers.

INTRODUCTION

Methodology can be understood as methods used for gathering information and the specific reasons for using such methods. Furthermore, methodology should concern aspects of how gathered information is transformed into data and why the transformed data are relevant in relation to a framework (Skott, 2014). The process of transforming gathered information into data is done in steps. Gathered information needs to be structured. Structured information is used when generating data. The generated data is then interpreted by using a conceptual framework. This means that there is a relationship between methodology and theory (Gee, 2014). This paper focuses on the first step of this transformation, the choice of methodological tool in relation to a conceptual framework, and on how this methodological tool is used for structuring information on a micro level in a study concerning

student teachers at the primary level. Microanalysis allows access to finer details of gathered information (Jarowski & Potari, 2009), in this case highlighting the functionality of language.

In this study, concerning primary student teachers, the overall aim is to contribute insights about the role, if any, that teacher education programmes and experiences from other relevant past, present and future practices play in influencing generalist student teachers' tales of themselves as emergent primary mathematics teachers. Tales refer to stories teachers tell about themselves and can imply more creative or imaginative storytelling. Other relevant practices include those related to the teaching and learning of school mathematics, but they may also be non-mathematical and not institutionalised. Furthermore this study seeks to understand how these different practices and experiences are related, if at all, to each other.

This means that the methodological tool needs to disentangle elements of teacher education and relevant practices in relation to different entities, experiences related to these elements of teacher education and relevant practices, the tense in which these experiences are described, what role these experiences play in terms of degree of certainty and the relationship between these different practices. This interest draws on the highlighted concern that primary generalist teachers within their first years in the profession may not prioritise, or may have no opportunity to prioritise, the subject of mathematics itself (Palmer, 2013).

Emergent student teachers at the primary school level are typically generalists, expected to teach a range of different subjects in the future. Consequently, their level of education in each of the school subjects is modest, and their professional background is less

linked to the teaching of specific subjects than to the profession as a whole. In Sweden, for instance, the combined course in mathematics and mathematics education for primary school student teachers is a 30 ECTS point course in the four-year teacher education programme (240 ECTS).

Recently, there has been extensive interest in student teachers' image of teaching mathematics, their knowledge gained during teacher education and how their image of themselves as teachers evolves in relation to practice. Standard procedures for assessing these have involved research about student teachers' beliefs, mathematical knowledge for teaching, and identity (Skott, 2013). The first two research fields have generally interpreted human behaviour as something enacted within a person and it is generally explained by acquisitionist research perspectives. The last research field has generally interpreted human behaviour as situated in practice and explains it using participatory research perspectives (Sfard, 2008).

However, in all three research perspectives attention to student teachers themselves as the unit of analysis has decreased over the years. The main focus is not on the student teacher. Instead, the focus is on, for example, the domain-specific beliefs, the knowledge needed for practice and the specific community of practice. In contrast, this study intends to focus on the student teacher as the unit of analysis and therefore uses the PoP framework. This is because PoP intends to describe the pre-reified processes that are said to precede the so-called construction of beliefs, knowledge and identity (Skott, 2013) and, above all, PoP places the student teacher at the centre of the analysis (Skott, 2014).

PATTERNS OF PARTICIPATION

When theorising and interpreting the role that teacher education programmes and experience from other relevant past, present and future practices play in influencing generalist student teachers' tales of themselves as emergent primary mathematics teachers, the conceptual framework Patterns of Participation, PoP (Skott, 2013) is used. PoP "seeks to understand how a [student] teacher's interpretations of and contributions to immediate social interaction relate dynamically to her prior engagement in a range of other social practices" (Skott, 2013, p. 549). Lerman (2013) highlights the need for frameworks that emphasise

emergence and regards PoP as such a framework. He implies that Skott, through the PoP framework, tries to go beyond the demarcation of the acquisitionist and participatory perspectives.

PoP provides the researcher with thinking tools (Gee, 2014) to use when planning and designing a study, and also when interpreting the patterns in the immediate emerging social practice on a macro level. The conceptual framework is therefore used to go beyond the micro level in order to focus on the social practice and situation (Jarowski & Potari, 2009). PoP draws on two main theoretical sources, symbolic interactionism and social practice theory. Symbolic interactionism views humans as actors and reactors in situations, and it positions meaning as something that one engages in when experiencing things in the situation. Humans respond to the situation by interacting with others and with the self, and by taking the role of others (Prus, 1996). In social practice theory, student teachers' identity formation and learning results from shifting participation in relevant practices (Skott, 2013). Identity is viewed as imaginings of selves expressed in actions and created in immediate social interaction. Identities develop and are expressed in social practice (Holland, Skinner, Lachicotte, & Cain, 1998).

PoP focuses on immediate emerging social interaction. Immediate social interaction is concerned with the relationship between a social practice and a text produced within it. A text is considered any instance of language used as part of a situation. The situation is regarded as the "environment in which meanings are being exchanged" (Halliday & Hasan, 1989, p. 12). Individuals' interpretations of the situation emerge as they interact symbolically in past, present and future practices (Skott, 2013), intra-personally as well as inter-personally (Sfard, 2008), and this interaction contributes to the production of texts (Halliday & Hasan, 1989). This means that every situation is unique and the gathered information is situated in time and place.

Skott (2013) and Palmer (2013) use a qualitative approach inspired by grounded theory to disentangle prior engagement in immediate social interaction. Inspired by social semiotics, this study turns the disentangling of immediate social interaction in a different direction, that of linguistics (Ebbelind & Segerby, 2015). It does so for several reasons, for example, to focus the analysis on the functions of language while

highlighting the uniqueness of the situation, and to incorporate a systemic way of structuring the gathered information on a micro level that specifically focuses on the text itself while highlighting the relations between different experiences in terms of language as functional.

To conclude, PoP has an interpretive stance that implies that human behaviour is different from objects that can be measured statistically. An interpretive stance also implies that there is no intention, in this study, to discuss cause and effect through different variables in relation to teacher education. However, questions of validity and trustworthiness need to be addressed. According to Gee (2014) and Skott (2014), validity in this kind of social research concerns the relation between theory and methodology, how they work together. This recognises that the macro level includes the micro level (Jarowski & Potari, 2009).

Therefore, the specific aim with this paper is to evaluate whether Halliday's Systemic Functional Linguistics, SFL (Halliday & Hasan, 1989) can be a proper methodological tool for disentangling the information gathered for this study. The reason for exploring SFL is that SFL is suggested and regarded as a powerful tool for visualising context in text (Herbel-Eisenmann & Otten, 2011; Morgan, 2006). To explore SFL, a short transcript will be analysed with this tool and then related to PoP in the discussion.

METHODOLOGY

The present study adopted a theory driven, multi-sited ethnographic approach. It involved three student teachers and followed them before, during and after different situations such as lectures, seminars, internships, study groups and examination work related to mathematics education.

The study was theory driven (Walford, 2009) because PoP (Skott, 2013) guided the choices made during the ongoing project. The study was multi-sited because the mode of construction was not a single site; instead, the mode of construction was a process, the emergent generalist teacher, that took place in multiple sites (Pierides, 2010). The ethnographic approach implies the use of multiple methods for gathering information, including field notes, interviews and the collection of other text material. The reason for using multiple methods is based on the assumption

that different types of material contribute different types of information.

The gathered information needed to be structured in relation to the aim and conceptual framework. For this purpose SFL was used. Among research that has been conducted internationally in mathematics education studying the role of language, Morgan's (2006) use of SFL to visualise experience in school mathematical assessments is the most well known. Another example is Herbel-Eisenmann and Otten (2011), who set out to reveal mathematical meaning potentials construed in discourse and used SFL to visualise semantic structures of mathematical content. SFL views language as a resource that people use to accomplish specific purposes through the functions of language (Halliday & Hasan, 1989). The functions can be analysed at the clause level to understand how contexts are reflected in the linguistic choices that participants make in their text production.

Systemic Functional Linguistics

SFL states that every speech act is about something (ideational meta-function), is addressed to someone (interpersonal meta-function), and is presented and connected in a specific way (textual meta-function).

The ideational meta-function relates to the main verb and concerns how actions or experiences are articulated through the transitivity system. The transitivity system illustrates how actors are connected to actions or objects (Halliday & Hasan, 1989). The main verb can either be a material process, in which there is an actor that does something; a mental process, where a senser is addressing a phenomenon; a verbal process, expressing something that has been said; or a relational processes, emphasising relations between objects.

The interpersonal meta-function relates to voice, tense and modality. Voice highlights the personal pronoun and entities visible in the text. Tense highlights whether the proposition is valid for the present, past or future. Modality relates to the degree of certainty in an utterance. This function answers the questions: What persons and entities are visible in the text and how are persons and entities connected to the text?

Finally, the context and language structures used to carry the meanings of the text are components of the textual meta-function. This function concerns the process of structuring the way information is con-

veyed. By looking at the theme and rheme one can view how clauses follow each other in thematic bindings. When several of these thematic bindings occur, a lexical chain is created. One can also view the use of conjunctions. Conjunctions show how different experiences are related to each other. For an extended description of the meta-functions see Ebbelind and Segerby (2015).

Background of the student and the text

The texts selected for analysis in this paper come from a semi-structured interview with a student teacher during her second internship, after two years and three months of study in the programme. The student teacher, who was in her early 20s at the time of the interview, began the teacher education course immediately after high school. During the first internship and the later 30-credit course in mathematics education, she did not talk much. When she did speak, her tone was low and her body language withdrawn. This was also observed during several interviews and observations. During the second internship the researcher was present, attending lessons and meetings. The observations made on these occasions marked a major shift in the student teacher's participation related to the mathematics classroom, from shy and quiet to straightforward and self-confident. The selected text from this interview, presented below, was then analysed through SFL.

The transcript

- Researcher: So, in some way, you felt more secure. [Yes] Or if you were not secure, then you were at least much more determined. [Yes (content in intonation)] How do you experience this? Secure or determined, or the difference from last time.
- Evie: I have got more training to stand in front of pupils and speak. More teaching hours on this internship than the other, that is probably the biggest difference.
- Researcher: But have you spoken much about [the changes in] your voice? That you use your voice in a totally different way now than you did before. Is that something you have been speaking about or something that you have been trained in?
- Evie: No, I think that a lot of this is from my soccer referee career and from different

referee courses and refereeing at different levels. That comes naturally, how one uses one's voice for speaking to the players on the field in the same way one speaks to pupils in the classroom.

Researcher: But when did you begin this referee initiative?

Evie: I began refereeing at a senior level during the summer of 2010, but then the initiative began during the winter when I found out, found out that I was nominated to the next level in connection to the "elite camp for girls" this summer.

Researcher: Has anyone besides me pointed this out, about your voice?

Evie: No, no one from the course, but the inspectors when I referee (laughing), they point out that I speak well and distinctly when I speak with the players.

ANALYSIS

Ideational meta-function

The transcript is a sample of an interview between two people where the researcher guides the conversation. The student teacher makes linguistic choices when discussing her engagement in past, present and future practice. The researcher asks the student teacher about the perceived change through the mental processes *felt* and *were* and opens the interview and addresses this perceived change with the mental process *experience*. When describing the origin of this experience, the verbal process *speak* and the material processes *got* and *stand* are used. The researcher's sensing is answered with examples from the physical world. The researcher tries to identify the origin of the changed *voice*, or relationship, through the verbal process *spoken* and the material process *trained*.

The student teacher then uses the mental process *think*; however, *think* is used to describe the relation between "soccer referee career" and the researcher's utterance "you use your voice in a totally different way" and is therefore regarded as a relational process. Furthermore, the student teacher uses the material processes *referee* and *use* in relation to the first relational process *think*. The choice of saying "one speaks to pupils" is important in this transcript. Here, *speak* is a relational process between the management of a soccer field and a mathematics classroom. Speaking with soccer players and pupils learning mathematics

can, through this choice of words, be interpreted as equal ways of communicating.

The researcher then uses the material process *begin* to locate the tense of the “referee initiative”, and the student teacher answers twice with the same word; however, *began* in the answer is considered a relational process. In the last interference by the researcher the verbal process “*point this out*” is used to see if someone else has registered the change. The student teacher emphasises that no one from the educational side has highlighted this change, but uses the verbal processes *point out* and *speak* in relation to inspectors from the Swedish Soccer Association.

Interpersonal meta-function

The researcher poses questions with prompts such as “*do you experience*”, “*have you spoken*” and “*when did you begin*”, and the student answers the questions. The student teacher’s prior and present internships, the change as perceived by the researcher and soccer referee career appear in the interview as entities.

In the first section two questions and answers are concerned with this change that the researcher has recognised. In the third question, the researcher uses the mental process *experience*. When answering this question, the student teacher uses *I* and draws on her past and present experience through internship. In the second section the researcher uses the personal pronoun *you* five times. The first two *you* are related to the verbal process *spoken* and involve the internship supervisor, and the last three address the student teacher. In the answer, the student teacher uses *I* and relates to the fact that *one* needs to use one’s voice both as an referee and as a teacher in the classroom. *They* is used to emphasise that the inspectors are the ones that have highlighted her way of behaving, “*I speak well and distinctly*”.

As already indicated, the modality is strong at the beginning when the student refers to having “*got more training*”. The tense is used to refer to the difference between the present and the past internship “*on this internship than the other*”. When the student teacher first mentions the “referee initiative”, the validity becomes low through *think*; however the validity becomes stronger and ends with strong linguistic validity with “*they point out*”.

Textual meta-function

The researcher links the first and second questions together with the disjunctive conjunction *or* and the interrogative *if*. The comparative conjunction *then* is used to relate the two internship experiences to each other. The additive conjunction *and* is used to turn the low validity of the clause to provide the clause with stronger validity. The conjunction *but*, used in the last answer, is used to exclude the teacher education from the discussion and promote the inspectors. This is an adversative conjunction, which means that there is something contrary to what one might expect.

Looking at the theme and rheme in the transcript reveals that the feeling promoted by the researcher is followed up by the student teacher in relation to the different internship experiences (first and second internship). The researcher uses this rheme to formulate a question, theme, about whether the student teacher has articulated this difference. In the rheme the researcher asks if it might be something the student has been trained in (during internship). At this point the lexical chain is broken by the student teacher when adding the “*referee initiative*”.

DISCUSSION

This paper focused on methodology and the transformation of gathered information into data, more specifically on the use of Systemic Functional Linguistics as a methodological tool for structuring gathered information on a micro level, enabling interpretations using the conceptual framework Patterns of Participation on a macro level.

PoP seeks to understand how teachers’ interpretation of and contribution to immediate social interaction relate dynamically to what Skott (2013) calls prior engagement in a range of other practices. This is in line with the aim of the study, which problematises the role, if any, that teacher education programmes and experience from other relevant past, present and future practices play in influencing generalist student teachers’ tales of themselves as emergent primary mathematics teachers and how these different relevant practices and experiences are related, if at all, to each other.

As indicated in the first section, the methodological tool needed to: disentangle elements of teacher education and relevant practices in relation to differ-

ent entities; identify the tense of these experiences; disentangle the role these experiences play in terms of degree of certainty; and visualise the relationship between these different practices and experiences.

Through the voice, interpersonal meta-function, persons, entities and social practices became visible in the text, for example, the referee inspectors *they*; the student teacher herself, “*I speak*”; the “*referee initiative*”; and the student teacher’s participation in “*different referee courses*” and *internship* related to mathematics education.

The transitivity system, ideational meta-function, indicated how actions or experience were related to persons, entities and social practices. This was done through the main process verb, for example, the verbal process *speak* when describing the origin of the experience indicated by the researcher, the mental process *think* when relating to the “*referee initiative*” and the material process *referee* relating to refereeing soccer games and how to act in classrooms.

The tense highlighted whether the proposition was valid for present, past or future time. An example of this is when differentiating between the present and the past internship “*on this internship than the other*”.

When disentangling the role that persons, entities and social practices play in terms of degree of certainty, modality was used. One can see, for example, that modality is strong in the utterance “*have got more training*” and low through the mental process *think*.

Finally, the methodological tool needed to visualise the relationship between these different practices and experiences, if any. This was done by looking at the relational process, ideational meta-function, through the use of conjunctions and theme/rheme. For example *speak* was used to describe the relation between the management of a soccer field and a mathematics classroom. Another example was the adversative conjunction *but* that was used to promote the referee inspectors instead of teacher education. Looking at the theme and rhyme in this transcript it can be seen that the lexical chain was broken by the student teacher when adding the “*referee initiative*”.

CONCLUSION

On a theoretical level Morgan (2006) highlights that SFL is a systemic way of visualising the relation between text and practice. Through the structuring of the information it is clear that the student teacher’s *contribution* to an *interpretation* of immediate emerging social interaction can be linked in a fine-grained manner to the “*prior engagement in a range of other social practices*”, for example, internship (past and present) and the current referee initiative. It is also clear that the fine-grained analysis highlights small but important parts in relation to the aim of the study. However, PoP does not highlight relevant practices, but sets out to highlight the way the re-engagement is conveyed and connected. In this perspective, the textual meta-function models links between practices, experience and entities, but maybe more important, the relational process links do not just go forward in chronological order. The relational process also indicates links back in the patterns that are created in the emergent social immediate interaction. These different links combine the re-engagement in prior and present practices into patterns.

I hold that I am coordinating two different perspectives. Prediger, Bikner-Ahsbals, and Arzarello (2008) make a distinction between coordinating and combining theories. They define coordinating as a term for bringing theories together that contain interpretations of notions that are compatible, whereas combining is when theories are only juxtaposed. In both PoP and SFL, immediate social interaction is central; more important, PoP set out to describe practices that are within the text produced in the immediate situation. SFL not only visualises the practices, it clearly shows how the different practices, in Skott’s terminology, are linked together.

To conclude, SFL used as a methodological tool allows a text analysis on the micro level of the text, and PoP allows an analysis on the macro level related to practice. In this sense the theory and method seem to work together. The validity in Gee’s terms is, from this perspective, strong.

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