REFLECTIONS ON RECONTEXTUALISING BERNSTEIN'S SOCIOLOGY IN TEACHERS' INSTRUCTIONAL STRATEGIES

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In this paper we discuss the complex process of developing an in-service teacher-training program that aims at promoting teachers' explication strategies. Therefore, we critically examine this process from the sociological perspective that has provided the theoretical basic tenets for our work. Following Basil Bernstein's sociology of education, these basic tenets are, 1.) that the recontextualisation of knowledge in schools creates a social order, 2.) that the hierarchising of meanings that permeates this process is constructed in social arenas outside school, and 3.) that a mathematics education for social justice requires the explicating of hierarchies of meanings in school. An analysis of one teacher's realization of instructional explication strategies will build the grounds for this reflection.

INTRODUCTION

In the last decades, the amount of research on the social and political dimensions of mathematics education has significantly increased. One of the theories that is often applied as a frame of reference is Basil Bernstein's sociology of education. In this paper we want to present and reflect first attempts to recontextualise research-findings from our research-group (e.g. Gellert & Hümmer, 2008; Gellert, 2009, Gellert & Straehler-Pohl, 2011; Straehler-Pohl & Gellert, 2012) that stem from this theory in classroom practice. A crucial component of a pedagogy that bears the potential for social change on the school level is to make the criteria for evaluation explicit and visible for all learners, while keeping a high level of conceptual demand (e.g. Morais, 2002; Gellert, 2009). At the same time, we maintain that this abstract claim is not a general rule in the sense that it can be applied in the same way at any place at any time. Rather, the meanings of *explication* and *high level of conceptual demand* call for a sensible recontextualisation respecting the particularities of actual educational contexts. Recontextualisation of pedagogic theory into practice can never be a direct transfer that is independent of the particularities of the target-context. Making our research findings that operate on a high level of abstraction accessible for teaching practice therefore calls for a cautious reflection on the potentially emerging boundaries within particular contexts. For example, research all across the world has shown that in contexts of low-ability expectations or in contexts of low-class (while the former are not seldom a result of the latter) teachers tend to draw too extensively on students' supposed experiential environments (e.g. Hoadley, 2007 for South Africa; Straehler-Pohl, Fernandes, Gellert & Figueiras, forthcoming for Spain). In order to transform these tendencies, it does not suffice to declare the reduction or abandonment of real-world contexts in mathematics classrooms with lower-class learners. The documented cross-contextual similarities in the teachers' discourses should rather make us aware, that there might be structural reasons within *and* across the teaching-contexts that reinforce these teachers to teach in the way they do. We try to target exactly these institutional contexts with students who are supposedly *inferiorly able* and *socially disadvantaged*. Thus, our didactical aim is to help teachers to comprehend their interactional routines and transform them in a more empowering way. We sought to approach this by designing an in-service training for practically promoting a pedagogy that we theoretically have identified as favorable for students of marginalised backgrounds. These students have to be regarded as a 'risk-group' concerning their further educational and vocational opportunities and whose social participation is massively jeopardised. We argue, that this is not solely a matter of more or less effective learning but has to do with a differential distribution of different kinds of knowledge to different social groups. With the *pedagogic device*, Basil Bernstein provides a conceptual frame, how this process *is structured* and in turn *structures* pedagogic practice. The pedagogic device enables us to understand, why it is important for teachers to develop instructional explication strategies in order to do more than just lifting the mathematics achievement of at-risk students to a basic-competence-level, but making accessible a code that is a carrier of *power* within *and* outside the mathematics classroom.

THE PEDAGOGIC DEVICE

The pedagogic device comprises three rules that constitute the basis for any pedagogic discourse: the distributive rules, the recontextualising rules and the evaluative rules. All three rules are hierarchically interrelated with the distributive rules being at the top. *Distributive rules* regulate the formation of systems of meaning through the production of specialised knowledge and thus hierarchise different forms of knowledge. According to Bernstein (2000), the distributive rules constitute a social arena in which meaning hierarchies are negotiated and determined. Following Durkheim, he differentiates between two general forms of knowledge. On the one hand, there is *esoteric* knowledge that has a more distant relation to a material base and is thus less context specific. *Mundane* forms of knowledge, on the other hand, have a closer connection to a specific context due to their proximity to a material base. On the level of the distributive rules esoteric knowledge is categorized in a higher hierarchical position than mundane knowledge. This is important for the level of the *recontextualising rules* where the reproduction of knowledge is regulated. Here, meaning hierarchies are again negotiated but in dependency on the distributive rules. While, from a theoretical perspective, the recontextualisation is reliant on, but not determined by the distributive rules, empirically, the recontextualising rules seem to reproduce the hierarchies agreed upon on the distributive level. The re-structuring of categories of knowledge by recontextualisation does not follow the intrinsic rules of the original discourse but takes place according to a specific logic of transmission. Thus, meanings are again hierarchised and structured, but in a way distinctly different from the original discourse. In contrast to the higher-level rules, the *evaluative rules* do not regulate how forms of knowledge are hierarchised but make the hierarchical relations visible by means of evaluation. Evaluative rules become visible for example in standardized assessments or in teaching practice. In the context of pedagogical practice, evaluative rules evoke a transformation of knowledge into consciousness of the individual, that is to say knowledge is reproduced. In order to allow students to perform successfully in school, the intrinsic rules of the pedagogic device need to be explicated. We conclude that, *within* the classroom, teachers cannot effectively challenge hierarchies of meanings that operate *outside* the classroom. *Within* the classroom, their agency is restricted to the level of the evaluative rules: They may or may not realise a pedagogic practice that explicates the hierarchies that are the outcomes of the pedagogic device in its present state; they may give access to dominant discourses or to dominated discourses.

Gellert (2009) makes us aware that keeping particular *rules of the game* implicit and leaving it to the students to independently make their way from the mundane to the esoteric (or fail at it) is a part of the common sense on teaching mathematics. However, if teachers aim at offering all students the same chance to successfully partake in socially valued forms of classroom activities, they need to make the outcomes of the device transparent, so that the hierarchy of esoteric and mundane forms of meanings and knowledge can become visible for all students. Gellert (2009) suggests that the rules that need to be made explicit permeate the pedagogical practice in mathematics classrooms on the following levels:

1. which area of mathematics is taught (algorithms, tasks drawing on real-life experiences, heuristics etc.),
2. if and in what way school mathematics is related to academic mathematics or to everyday knowledge,
3. what constitutes a successful participation in mathematics lessons and which criteria a student's contribution in class has to fulfil.

In one way or another, all these levels contain a relationship between the mundane and the esoteric. Consequently, we encourage teachers to depart from the common sense of leaving certain rules of the pedagogical game implicit in order to enable more students to become successful learners in the mathematics classroom. When we take into consideration the research, exemplarily referenced above, we need to be aware that implementing a pedagogy that explicates the hierarchy of the esoteric and the mundane without disempowering and alienating students and teachers is a sensitive and long-term endeavour.

PROMOTING INSTRUCTIONAL EXPLICATION STRATEGIES

Our project's goal was to design an in-service teacher-training program where teachers develop strategies and practices of explicating implicit rules of school mathematics. This training is explicitly not aimed at providing materials, influencing teachers' beliefs or transmitting knowledge, but seeks to build on teachers' existent interactional routines. Brought to consciousness, we argue that these routines can provide the basis for the development of effective explication strategies. As Bernstein

(2000) makes us aware, the move from decontextualised meanings (e.g. sociological theory) to contextualised meanings (e.g. pedagogic practice) is never a matter of direct transfer but inevitably follows a recontextualisation process, where relations of meanings are re-ordered and re-negotiated (see recontextualising rules above). In order to realize such a negotiation process and to integrate it in the concept of the teacher-training we involved experienced teachers in the designing process. This is in line with research results indicating that participants of such programs accept and apply the suggested ideas more likely when other teachers partake in the designing-process of the program (e.g. Lipowsky, 2010). We invited six teachers who work with 'at-risk students' in their daily practice to join us in the process of planning the teacher-training program. Over a period of four months we convened three meetings that took a whole weekend each. At the beginning stood an introduction to the general problematique of implicitness of evaluative criteria and the challenge to explicate them, inspired by recent sociological research in mathematics education (e.g. Dowling, 1998; Cooper & Dunne, 2000; Gellert, 2009;). Based on this introduction, a discussion was initiated in which we could relate our rather theoretical perspective to the teachers' everyday practical experience and vice versa. This discussion resulted in the choice of four domains that all of us consensually regarded as crucial for explicating the dominant code: a) verbal modes of expression, b) modalities of documenting learning processes, c) everyday context problems, and d) mathematical games.

a) The domain 'verbal modes of expression' shall enable learners to recognize and realize utterances within a school mathematics register in delineation of an everyday or common sense register;
b) In the domain 'modalities of documenting learning processes' the main aim is to make individual learning processes visible by opening up discussions about evaluative criteria;
c) The *right amount* of reality to take into account when dealing with 'everyday context problems' is not a fixed quality depending on the given problem sui generis. Rather it may vary with different contexts (e.g. "problem of the week" might differ from standardized tests). The ability to recognize and realize this right amount is a crucial condition for achievement.
d) The domain 'mathematical games' is concerned with the use of games in the mathematics classroom and aims at revealing the boundary between *a logic of play* and *a logic of school mathematics* in order to enable learning for those who tend not to recognize this boundary.

In each domain we figured out possibilities of implementing interactional explication strategies in the mathematics classroom. The teachers then tried to put these ideas into practice. First attempts of this recontextualising of the theory into the context of the teachers' particular situations were videotaped in order to attain two objectives: Firstly, we aimed to reflect on the potentials and boundaries that emerged. Secondly, sequences of the videotapes shall be used in the in-service teacher-training program for the purpose of illustrating and reflecting on the recontextualisation.

ANALYSIS

In the following we will present and analyse a case study on Paul, one of the six teachers, who took part in the project so far. We will start with a brief introduction of Paul, based on our shared experiences in the run-up of the lesson. Paul gave this lesson in order to provide us with videotaped illustrative material for the planned teacher-training program. Then we will briefly present the mathematical game Paul chose for his lesson and finally analyse his approach on explicating implicit rules of school mathematics from our perspective.

The case of Paul

Paul works as a teacher in the 8th and 9th grade (in the age of 13 to 15) at a “Förderschule”, a school that exists beside the regular school system and brings together children with socio-emotional ‘disorders’ and cognitive learning disabilities. Additionally, a high migration rate and a low socio-economic structure in the feeding area affect the school’s daily routine. Paul teaches all subjects in his classes. He did not study mathematics as an academic subject. We experienced Paul as a very calm and patient person, who does not let himself be disturbed when being challenged or questioned. We would describe him as 'down-to-earth' with a close contact to the students’ realities. His motivation for taking part in the project is rather a general openness and the motivation to improve himself as a (mathematics) teacher. Paul chose the domain of mathematical games for his lesson.

Paul’s game: Nummero

For his lesson Paul chose the game “Nummero”. In this game each participant selects a number between one and one hundred. S/he keeps the number secret. The other participant will have to find out this number by asking questions about it. There is a fixed set of allowed questions that are printed on game-cards, such as “Is it an even number?” or “Is the number between … and … ?” (the students have to fill the gaps on their own). On the basis of the given answer, the asking participant can eliminate an amount of impossible numbers by crossing them out on a hundred board (see Fig. 1) in order to keep track of the numbers already eliminated. The participants alternate with asking a question. Whoever finds out his opponent’s number first is the winner of the game.

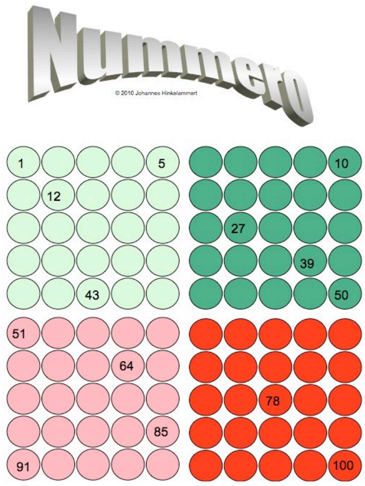

Fig. 1: Nummero

Discussing the game

As Paul and the research team considered the game as not challenging enough for his own 8th and 9th grade classes, Paul asked a colleague in a 5th grade (students are in the age of 10 to 11) for permission to take over one lesson. While his colleague agreed, he expressed serious concerns that the game would be too demanding for his students. As it was not his own classroom, Paul agreed on choosing another, much less demanding game. However, this game proved to be free from any impulses for mathematical reasoning and hence was entirely unsuitable for the declared purpose of explicating the hierarchy of a logic of play and a mathematical logic within the mathematics classroom. Finally, we presented Paul's colleague the choice to either let Paul proceed with the more challenging game or to cancel the lesson. Paul seemed pleased to have the opportunity to try to prove his less optimistic colleague that the students can do more than he expected.

Paul's lesson: Data and Analysis

Interaction I: Paul opened the lesson by announcing that they will play a game. He emphasised that besides playing, his students are supposed to "learn something". In a short conversation Paul introduced a hundred board (see Fig. 1), where he asked some students to fill out missing numbers. He announced that he would explain the rules of the game by means of playing a first round with the whole class against the teacher. He showed them a piece of paper on which he had noted a number that they were supposed to find out. Thereupon Paul asked a student, Sven, also to choose a number. Doing so, Sven wrote down '86' and fixed it in a way that his classmates could see it, but not Paul. After this, Paul introduced the game-cards with the questions. The first card enabled Paul to ask for a specific figure contained in his number. Accordingly, Paul questioned if 'five' is contained what the students negated.

Paul:	Well, then I can cross off some numbers that are not possible any more. [...] So the five is not contained. Then, of course it can't be the fifteen either, can it? [*He starts crossing 5 and 15 by drawing a line*]
Students:	No. [...]
Paul:	And twenty-five, thirty-fi-, forty-five they are all impossible. [*He crosses out the column from 5 to 95]* Okay. And… but the fifty-one isn't possible either, is it?
Students:	No. [...]
Paul:	Fifty-one is impossible. Exactly. Then I'll cross it as well. *[He starts crossing the row from 51 to 59, and then, asked by a student, he also crosses 50]*

Analysis: The teacher chose a trajectory from a school mathematics content to the mathematical game. Thus he first drew the attention to the hundred board and just then shifted to the rules of the game. We interpret this as a sign of sensitivity for providing a dominant space for the mathematical side of the activity. When taking the first game-card, the instructions on the card triggered off a conversation between the teacher and the students, in which the teacher offered an insight into his thoughts. He asked his students questions in order to involve them in the game and simultaneously to share his ideas. This decision to openly discuss a strategy is characteristic of a school mathematical logic. In everyday contexts, competing participants of a game would not be expected to uncover their thoughts or even to help each other. However, even though Paul brought up the situation of sharing thoughts on strategies, he did not delineate it from the logic of play since he did not contrast his approach to playing games outside the classroom. In addition, he did not initiate a discussion about the meaning of crossing a whole row or column, but only verbalized the crossing out of single numbers. Thus the school mathematics' aim of reasoning ran danger of fading behind the need to proceed in the game.

Interaction II: The students picked a card saying "Is the number greater than…?".

Sven:	Is the number greater than... seventeen?
Paul:	Than?
Sven:	Is the number greater than... fifty-seven?
Paul:	Than fifty-seven. No, it is less. Okay, now you have to cross out your numbers. […] The number is less than fifty-seven.
Sven:	[*shows with his pen somewhere between 46 and 47:*] Up to here.
Paul:	No, less! Listen. Is the number less… what did you ask?
Sven:	Than fifty-seven.
Paul:	Is the number greater than fifty-seven. And I said no, means it is less.

Sven then started crossing out numbers that are greater than 57, but left out the 88 and instead, falsely crossed out 51 to 56. A discussion on which numbers need to be crossed out emerged between the teacher and the students.

Analysis: The discussion between the students and the teacher revolved around the question whether the numbers less or greater than '57' need to be crossed out. This resulted in a strong emphasis on a game-procedure, while the reasoning on strategies (e.g. why to choose 57) completely faded into the background. Emphasising the dominance of a mathematical logic, Sven would have had to explain his strategy behind choosing the number '57'. However, the teacher did not ask Sven to explain but instead instantly requested him to cross out his numbers. Thus, at this point, the implicit expectations within the mathematics classroom of unfolding mathematical strategies in order to 'improve the success' in playing was not made visible to the students. Instead, the emphasis was on following the playing routine. However, we can interpret the discussion about the meaning of 'less than' and 'greater than' as an effort to keep a mathematical frame of reference by emphasizing a mathematics *content*.

Interaction III: Paul's next card asked whether his number was located on the light-coloured half of the hundred board, which was approved by the students.

Paul: My number is located on the light-coloured half, right? [...] Well, then I can cross all dark.

Sven: On the dark [*pointing on the dark-coloured half*] [...]

Student: (...) on the dark side?

Student: On the light side.

Paul: Have a look, you wrote down a number for me. And this one is located on the dark, isn't it?

Analysis: The students seemed to have difficulties with deciding whether the teacher should erase the light-coloured or the dark-coloured half. The teacher repeatedly pointed out the number chosen by the students, thus trying to help them make their decision. At this point, again, the discussion focussed on a question exclusively tied to game-procedures, i.e. which part of the hundred board can be crossed out. Following a logic of school mathematics, it would have been fruitful to discuss what "dark side" and "light side" meant mathematically and how this knowledge could promote making a decision without searching the particular number in the hundred board. However, the students were not asked to explain or to justify their decision for one half of the game board. The focus on game-procedures again seemed to emphasize the logic of play while neglecting a school mathematical logic, thus giving the students a certain impression of how they are expected to think and behave in the mathematics classroom. That the hierarchy of these two discourses is actually the other way around is left implicit.

DISCUSSION

In this paper, we aimed to critically reflect on the potentials of recontextualising Basil Bernstein's sociology of education in interactional strategies for teaching that systematically strive for an explication of rules and criteria. Usually they remain implicit in mathematics classroom discourse, which hinders students from disadvantaged backgrounds to recognize what counts as a legitimate contribution and a desirable learning outcome. While research produces more and more evidence on how these processes occur in regular classrooms, our intention was to analyse intentionally created teaching-contexts in which explication is a conscious point on the teacher's agenda. In order to be able to evaluate the capacities of interactional explication strategies on a broader scale, this appeared to us as a necessary first step. We expect that confronting ourselves with the boundaries that emerge in such a process helps us canalizing our efforts.

Our analysis of Paul illustrates that reflecting on explicitness and its sociological relevance and bringing it to consciousness is a step into the right direction, however it proved to be a very first in a bigger number of necessary steps. The least we can say about the success of Paul's intervention is that it released the students from excessively lowered expectations. Still, we cannot conclude to having provoked a full suspension of a discourse of low expectations. For example, Paul's strong insistance on procedural aspects of the game is characteristic for such a discourse. Even though Paul has sensitized himself in the meetings and in our discussions to the importance of explicating the dominance of the logic of mathematics *within* the mathematical game by an emphasis on reasoning, he frequently missed out on situations that bore the potential for such an explication. We tend to see this contradiction not as a result of an inadequate realization of the aims that Paul set himself but rather as a result of the very structural intricacies that inevitably arise when using situations that *usually* are characterised by *implicitness* to *explicate* something. Taking up Bernstein's concept of classification, using games in order to explicate structural rules of school mathematics means juxtaposing a weakly classified activity with a strongly classified activity in order to explicate the boundaries that characterize the latter. This inevitably creates a situation, where the strong classification of the latter is challenged. As Bernstein (2000) makes us aware, classifications create a "*psychic system of defence*" (p. 12). A challenge of classifications initiates a threat to this system. So it appears quite comprehensible that the more and more Paul and his students proceed in the game, the more and more he loses track of explication and the more and more he is drawn towards a logic of play. However, we do not see this process as inevitable and conclude by giving up our belief in teacher agency. Rather, the analysis of the case of Paul has provided us with new insights, of which we can now effectively take advantage in the upcoming teacher-training program. Further, the existence of video-taped material gives us the opportunity to contextualize our findings for the participating teachers and thus going one step further in the recontextualisation of Bernstein's sociology in interactional explication strategies. In order to overcome a "psychic system of defence", one needs to be aware of it.

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