Authors: Anna T. Danielsson, Maria Berge, Malena Lidar,
Åke Ingerman, Leif Östman and Maria Svensson

**A bridge to understanding? An approach for analysing the construction of power/knowledge in a technology classroom**

**The power of classroom interactions?**

1. Teacher: How are the lolly sticks the strongest? From which side?
2. Student C: so? ((illustrates with a lolly stick))
3. Student A: yes, so…or?
4. Teacher: I won't answer that, discuss it

The above excerpt comes from a technology lesson in a Swedish classroom, where fourteen years old students are working with the construction of models of bridges. The students are working in groups of three or four and the teacher moves between the groups, asking them questions about their constructions and highlighting what is important to focus on. The exchange above between the teachers and the students C , A and (here) silent B is on a surface level similar to a rather traditional teacher student interaction, where the teacher asks a question, the students answer and the teacher makes some kind of evaluation of the students' answers (Chin, 2006; Scott, Mortimer, & Aguiar, 2006). However, even in this short excerpt it is clear that the teacher not only gives hints for the construction, but also communicates how the students' ought to work. And when doing so, establishes certain norms for student and teacher behaviour.

In our research we are, on the most basic level, interested in understanding what it going on in the technology classroom introduced above, with a particular focus in the relationship between power and (disciplinary) learning. In short, our wonderings concern the reciprocal relationships between the interpersonal micro level classroom interactions and intrapersonal aspects (such as pupils' attitudes to the subject) as well as macro levels (such as disciplinary culture, societal norms and structures, and school culture). During the workshop we are, thus, interested in discussing, both theoretically and empirically, how local and global power structures (including, but not limited to, societal norms, school and disciplinary cultures) intertwine with the learning (of technology). Further, we are also interested in exploring what is lost and what is gained by starting the analysis in the micro level interactions. Finally, we are wondering about which questions that may take our analysis further.

In our current analysis of the above classroom, we have started in the micro level of the teacher-student interactions, and by utilizing the analytical framework described below we have been able to visualize how knowledge and power are intertwined in individual instances of teacher – student interaction. However, while our current analysis has been successful in describing instances of interaction on what could be described as an interpersonal micro level we do not want to stop there, as implied by the wonderings formulated above. We will return to these wonderings in the discussion, after having introduced our analytical approach and its theoretical grounding.

**Entering the technology classroom**

The technology lesson described in the introduction has been analysed with the aim to explore how knowledge and power are co-constituted in meaning-making processes. The empirical data consist of video data from three ordinary technology lessons in one Swedish classroom in grade 8. The topic of these lessons concerned solid and stable constructions. The majority of the pupils worked in smaller groups with the construction of models of bridges, a very common activity when working with the topic of solid and stable constructions in Swedish classrooms. The lessons were video recorded, using multiple cameras. In our analysis we have focused on the second lesson and how two of the groups if pupils build bridges together, with special attention on their interaction with their teacher. In the first group the pupils were unsure if their first attempt of construction was correct and asked the teacher several times for verification and in the second group the pupils struggled with agreeing on how to start some sort of construction at all.

Three questions have guided our analysis. The first one is descriptive: What is happening in this technology classroom? The second one is subject specific: What do the students learn in this context, both in form of content knowledge and in form of norms and expectations for student and teacher behaviour in relation to knowledge construction? Here we used the analytical framework of practical epistemology and the concept of epistemological moves (Lidar, Lundqvist, & Östman, 2006) to

Authors: Anna T. Danielsson, Maria Berge, Malena Lidar, Åke Ingerman, Leif Östman and Maria Svensson

identify sequences in interaction where the teacher's directions/utterance/actions that have a function in influencing the direction that student meaning making takes. In short, practical epistemology is a description of what students and teachers use in action as relevant or irrelevant knowledge and appropriate ways to attain knowledge. In a practical epistemology analysis episteme is understood as a result of human beings functional coordination with their environment. Thus, meaning making is the way in how the encountered environment is made intelligible. In the meaning making process (/in teaching) the students encounter a lot of information. Of all this information, some parts or aspects will be considered relevant, while other aspects will be excluded. This process of inclusions and exclusions will make the meaning making process take a certain direction. A practical epistemology analysis explores how meaning making results in a more developed and specific repertoire of actions. The concept epistemological moves refer to the way in which teachers give students directions, on an interpersonal micro level like in the excerpt above. In our analysis, all the teacher's actions were coded in relation to the students' interaction, following how practical epistemology analysis considers interactions as a language game where people create meaning together. In total we identified six different epistemological moves. The first four kinds of epistemological moves were Generative moves, Instructional moves, Confirming moves and Re-orienting moves, all explicitly connected to the completion of the building task and the associated meaning-making and described in previous research (Lidar, Lundqvist, & Östman, 2006). The other two kinds of epistemological moves were Orientating utterances, where the teacher orientated herself about what the students were doing, and Privileging knowledge making moves, where the teacher communicated norms and expectations for student and teacher behaviour in relation to knowledge construction. To exemplify: In the excerpt in the introduction the teacher made two generative moves, in form of two questions "How are the lolly sticks the strongest? From which side?" which indicated what was most important for the students to pay attention to this context. When the students asked her about the correct answer she made a Privileging knowledge making move "I won't answer that, discuss it". Thus, the teacher explicitly communicated that she does not deliver answers: when the students have been given "clues" about how to construct a strong bridge they must come up with the rest of the solution by themselves.

Our third question concerned power in the classroom: How are knowledge and power constituted and related in the meaning-making processes on an interpersonal micro level? Here we used another analytical layer on the individual instances in our empirical data: Gore's eight techniques of power. Gore (Gore, 1995, 1997) has identified eight techniques of power, distilled from Foucault's work, and used these to analyse how power is exercised on a micro level in diverse pedagogical sites. The techniques of power are surveillance, normalisation, exclusion, classification, distribution, individualisation, totalisation, and regulation. Gore (1995) notices that this form of analysis is far from straightforward, as it is open for multiple interpretations and may even appear trivial at some points, but that it is the subtle character of the pedagogical regime that the analysis intend to capture. From her empirical analysis she concludes that there appear to be a certain continuity in the functioning of power relations in pedagogy, across, seemingly, very different pedagogical contexts. She also brings to the fore how, in the regime of pedagogy, the workings of power and knowledge are integrated, hence power/knowledge: "sometimes [the techniques of power] functioned in the construction of knowledge; at other times, they functioned in the construction among participants in the various sites; at yet other times, they functioned in the construction and maintenance of particular subjectivities" (Gore 1995, p. 183). When adding the analytical layer of techniques of power on our empirical data we found that all eight techniques of power were possible to identify (although distribution was not occurring during the second lesson). Again the teacher's actions were coded in relation to the students' interaction, and in line with Gore's analysis we were also able to code single teacher actions as sometimes exercising more than one technique of power. For example, "I won't answer that, discuss it", is both a form of *normalisation* (of a certain teacher behaviour) and at the same time a form of *exclusion* of student behaviour (especially in the light of continuation of the dialogue empirical data) – the students are not expected to ask that kind of questions in this context. Not surprisingly, because "educating *is* naming, communicating and upholding norms – norms of behaviour, off attitudes, of knowledge" (Gore 1995, p. 172), in this classroom we were able to identify many teachers actions that were coded as normalisation.

Following the excerpt in the introduction, the dialogue between the teacher and the three students continued:

Authors: Anna T. Danielsson, Maria Berge, Malena Lidar, Åke Ingerman, Leif Östman and Maria Svensson

5.     Student A: sigh ah…
6.     Student B: give us a clue
7.     Teacher:    I GAVE you a clue. Who is correct, A or C?
8.     Student B: A
9.     Teacher:    How come? Because he is your friend or because you believe in what he said?
10.    Student A: I don't know
11.    Student B: no, because I said that (inaudible) becomes like this…

The two teacher utterances "Who is correct, A or C?" and " How come? Because he is your friend or because you believe in what he said?" could be interpreted as a form of *classification*, the ranking of individuals and group (who is right, who is not right; but in the case of Student B also whether he is the kind of person who draws a conclusion based on who said something). Further, the latter utterance can also be interpreted as an *exclusion* of a way to ground a knowledge claim, i.e. knowledge claims in this technology classroom should not be based on who said something. The same two teacher utterances were also coded as generative moves, in that they show the students what was important to pay attention in this context: since students A and C have given different answers to the same crucial question student B should reason about who was right. The two analytical layers accentuate different themes in the same data, but share some important similarities: They are forms of micro analyses that are based on the reciprocal construction of power/knowledge (how an utterance is coded is dependent on how this utterance is received). Furthermore, they both focus on the construction of norms within in a situation; what is made possible and what is made desirable, in terms of behaviour as well as content matter.

**Taking a step back: Our theoretical grounding**
A key part in our research project is the continuous development of an analytical approach, combining "practical epistemological analysis" and "techniques of power", as described and illustrated in the previous section. In this analytical approach, we operationalise a Foucauldian power perspective by investigating how the epistemic practices identified in the practical epistemological analysis can be understood as constitutive of different techniques of power. In the following section we introduce our understanding of Foucault's work on power that is the basis of Gore's analytical approach described above. During the workshop we are interested in discussing our interpretation and application of Foucault's conceptualisation of power, but are also open to suggestions about other ways of approach an analysis of issues of power in classroom interactions.

Central to Foucault's conceptualization of power is the idea that power exists in a net-work of micro powers, rather than being located in a few individuals and organisations (Foucault, 1980, p. 198). He explains:

Power must be analysed as something which circulates, or rather as something which only function in the form of a chain. It is never localized here or there, never in anybody's hands, never appropriated as a commodity or a piece of wealth. Power is employed and exercised through a net-like organization. And not only do individuals circulate between its threads; they are always in the position of simultaneously undergoing and exercising this power. (Foucault 1980, p. 98)

Thus, Foucault is trying to make away with the idea that power not only is something some people exercise, instead we are all caught in its "net-like organisation". He argues that in today's Western society power no longer is practiced through the infliction of penalties but using surveillance. By being observed, or thought to be observed, the individual starts to act according to the expected behaviour, and has, thus, internalized this behaviour (Foucault 1997). Furthermore, that power relations exist everywhere implies that they are both repressive and productive:

What makes power hold good, what makes it accepted, is simply the fact that it doesn't only weight on us as a force that says no, but that it traverses and produces things, it induces pleasure, forms knowledge, produces discourse. It needs to be considered as a productive network that runs through the whole social body, much more than as a negative instance whose function is repression. (Foucault 1980, p. 119)

This implies that power relations are a precondition for our subjectivities, individuals do not exist outside them. Thus, power relations not only make us subdue to certain norms for behaviour, they are

Authors: Anna T. Danielsson, Maria Berge, Malena Lidar,
Åke Ingerman, Leif Östman and Maria Svensson

productive in that they make subjectivities possible. Öhman (2010, p. 397) explains: "individuals can thus be regarded as an effect of power at the same time as they create power through their actions, i.e. individuals set power in motion through their actions".

A key concept in Foucault's theoretical build, in particular when applied to an educational context, is power/knowledge. In this concept he communicates the idea that power and knowledge are always intertwined and can never be separated: "there is no power relation without the correlative constitution of a field of knowledge, nor any knowledge that does not presuppose and constitute at the same time power relations" (Foucault 1977, p. 27). Thus, any knowledge claim is simultaneously constitutive of power relations that make this particular knowledge considered legitimate and possible, and vice versa, techniques of power aims to control knowledge (Foucault, 1997).

**Towards new wonderings**

In our current analysis we have been looking at how instances of teacher-student interaction can be understood as simultaneously contributing to meaning making and producing power relations. Thus, analytically we separate knowledge and power, although we empirically (and theoretically) find constructions of knowledge and power closely intertwined. In much of the previous science education research constructions of knowledge and power have been approached as separate entities, studying either constructions of knowledge or of power, but without relating the two. For example, Candela's (1998) study of students' possibilities to seize local power in the classroom is situated in a science education context. However, she does not problematize the classroom processes and the discursive resources available to the students in relation to the disciplinary culture of science or in relation to the students' knowledge constructions. Furthermore, the research that do exist on power and disciplinary learning rather approach this issue from the perspective of implementing new participation structures in the classroom in order to foster an "authentic" learning of scientific practice (Ford & Forman, 2006). For example, Herrenkohl (2006) show that by restructuring the science classroom to minimize the presence of teacher as an authority the affirmation from peers became central for a students' scientific argumentation to be considered as valid.

At the core of our wonderings is a wish to take the situatedness of the *technology* classroom seriously in exploring the construction of power/knowledge. Among other things, this implies a need to acknowledge, not only on a theoretical level but also in our empirical analysis, that what happens in the studied technology classroom is by no means isolated from surrounding structural factors (on school level as well as societal and disciplinary levels). At the same time we wish to be closely attentive to the micro level interactions, as "it is precisely the mundane and subtle character of these practices" that according to Gore (1995, p. 169) contributes to the functioning of the pedagogical regime". This leads us to leave this paper with three new, general wonderings:

- What knowledge claims are possible to make based on the kind of micro analysis outlined in this paper, i.e. which research questions can be answered?
- In what ways are our analytical perspectives coherent/non-coherent and how can the theoretical foundation of our analysis be strengthened?
- In order to make knowledge claims about the constitution of power and knowledge in classroom interactions, what qualities do the empirical data need to fulfil (in terms of detail as well as content)? And, further, what is needed in terms of empirical data (e.g. frequency and extension of data collection) and macro "data" (referring both to "traditional" macro data such as biographical data about the students/teacher as well as the tacit and explicit knowledge about the students and/or the disciplinary culture possessed by the researchers)?

**References**

Candela, A. (1998). Students' power in classroom discourse. *Linguistics and Education, 10*(2), 139-163.

Chin, C. (2006). Classroom Interaction in Science: Teacher questioning and feedback to students' responses. *International Journal of Science Education, 28*(11), 1315-1346. doi: 10.1080/09500690600621100

Ford, M. J., & Forman, E. A. (2006). Redefining disciplinary learning in classroom contexts. *Review of research in education*, 1-32.

Authors: Anna T. Danielsson, Maria Berge, Malena Lidar,
Åke Ingerman, Leif Östman and Maria Svensson

Foucault, M. (1980). Two Lectures. In G. Gordon (Ed.), *Power/knowledge: selected interviews and other writings 1972-1977*. New York: Pantheon Books.

Foucault, M. (1997). *Discipline and Punish: the birth of the prison*. New York: Pantheon Books.

Gore, J. M. (1995). On the Continuity of Power Relations in Pedagogy. *International Studies in Sociology of Education, 5*(2), 165-188. doi: 10.1080/0962021950050203

Gore, J. M. (1997). On the Use of Empirical Research for the Development of a Theory of Pedagogy. *Cambridge Journal of Education, 27*(2), 211-221. doi: 10.1080/0305764970270205

Herrenkohl, L. R. (2006). Intellectual role taking: Supporting discussion in heterogeneous elementary science classes. *Theory Into Practice, 45*(1), 47-54.

Lidar, M., Lundqvist, E., & Östman, L. (2006). Teaching and Learning in the Science Classroom: The Interplay Between Teachers' Epistemological Moves and Students' Practical Epistemology. *Science Education, 90*, 148-163.

Scott, P. H., Mortimer, E. F., & Aguiar, O. G. (2006). The tension between authoritative and dialogic discourse: A fundamental characteristic of meaning making interactions in high school science lessons. *Science Education, 90*(4), 605-631.

Öhman, M. (2010). Analysing the direction of socialisation from a power perspective. *Sport, Education and Society, 15*(4), 393-409. doi: 10.1080/13573322.2010.514735

**Appendix 1: Video transcript**

27:42-29:06
L: How is it going?
A: eh we (inaudible)
C: no, we gonna (inaudible)
B: and then
C: (mumbling) no it can't be that way
B: or this way
C to T: look, I have it this way
A: I know, this way
C: then we have triangles all over
A: one down there one up there so, one down there and one up there
T: How are the lolly sticks the strongest? From which side?
C: so? ((illustrates with a lolly stick))
A: yes, so…or?
T: I won't answer that, discuss it
A: sigh ah…
B: give us a clue
T: I GAVE you a clue. Who is correct, A or C?
B: A
T: How come? Because he is your friend or because you believe in what he said?
A: I don't know
B: no, because I said that (inaudible) becomes like this…
C: no, but if I do it like this, then it becomes a triangle so it will hold [the weight]
A: no
T: From which angle do you place a load on the triangle? From which angle is a triangle the strongest?
B: (inaudible)
T: Like this or like this? ((illustrates with her hand on the lolly sticks in C's hands))
T: Now I have helped you so much, now I'll leave before say too much
C: a triangle is strongest like this ((illustrates with her hand)
A: ah, but she said like this or like this ((illustrates with her hand))
C: Well either over here, or like this
A: okay let's do this, eh, we did it right or?