# STUDYING THE EFFECTS OF A HYBRID CURRICULUM AND APPARENT WEAK FRAMING: GLIMPSES FROM AN ONGOING INVESTIGATION OF TWO SWEDISH CLASSROOMS

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*We report from an ongoing study of two Swedish mathematics classrooms, in which the students and their teachers are together for the first time at the very beginning of their upper secondary education. The students are enrolled in two different programmes, in which they study the same mathematics course. The investigation of these two classes is part of a larger comparative project that studies the emergence of disparities from a theoretical perspective that examines their social construction in the context of the practices of the mathematics classroom.*

## THE RESEARCH PROJECT

The data to which we refer are collected in an ongoing comparative research project involving classrooms from Canada, Germany and Sweden [1]. The researchers collaborating in the project are concerned with the emergence of disparity in achievement in mathematics classrooms. The project investigates the emergence of disparities from a theoretical perspective that examines their social construction in the context of the practices of the mathematics classroom while taking into account "outer" factors that might lead to the systematic exclusion of some students and to the success of others. That is, to identify discursive and interactional mechanisms that can explain if and how structural elements can be found in classroom interactions. A comparative approach aims at identifying the characteristics of these mechanisms in relatively homogeneous and in heterogeneous groups, in socially advantaged and disadvantaged groups. We start with the observation that teachers and students in mathematics classrooms after a short time come to know which students perform well in mathematics and which do not. This occurs even within different streams in which students are supposed to be starting at a comparable level.

The Swedish data comprise video-footage of the first eight respectively nine mathematics lessons in the two classrooms, recordings of interviews with all students and one of the teachers, copies of a test from one of the classrooms, textbooks and other material used as well as information about the students' social, cultural and economic backgrounds obtained from questionnaires. The two classrooms to which we refer are both situated in upper-secondary school. The students are studying the same mathematics course, but are registered in two different programmes. One focus of our study is to identify the ways in which the difference between the settings affects the students' access to academic mathematics. Some of the emerging issues might be of relevance in other educational contexts that have undergone similar curriculum transformations, from a more specialised version to an integrative.

## THE SWEDISH EDUCATIONAL CONTEXT

In Sweden, the classic model of progressive welfare state education comprised the introduction of the 9-year comprehensive school (grundskolan) in the 1960's and lead to an expansion of secondary education. The education system has undergone considerable changes since then. Strong central management and detailed regulation gave way to a system with increased autonomy for schools, which can decide about the organisation of work, choice of methods and class sizes. Important features of Swedish education can be seen in the high participation of children in public child-care and pre-school education, little formal streaming and tracking in the comprehensive school as well as the provision of both vocational and academic programmes in the same organisation in secondary education (gymnasieskolan, year 10 to 12). After completion of all programmes students are eligible for higher education, although there are different criteria for different university subjects as to the nature and amount of courses chosen by the students within the programmes. Consequently, the choice of the programme after nine years of comprehensive school and the selection of courses within the programme are important choices that affect students' identity, career opportunities and relationship with mathematics.

The number of compulsory mathematics courses varies across the programmes in the gymnasieskolan. The courses are named A, B, C, D and E. Course A is compulsory in all programmes. Theoretically, students in all programmes can choose more than the compulsory courses. The completion of each mathematics course comprises a national test, the results of which are meant to inform the teacher's evaluation of the students' attainment and are also reported to the school authority. The curriculum prescriptions are outcome based, formulated and tested for the end of year three, five and nine and for each of the courses in upper secondary education. The prescriptions include an outline of the evaluation criteria. The grading system comprises four levels: not pass, pass, pass with distinction, and pass with special distinction. The curriculum does not include recommendations for the order of topics, time allocation, pace and teaching methods.

Swedish classrooms very often show a high proportion of lessons devoted to individualised work with exercises from the textbook, where students work at their own pace occasionally scaffolded by the teacher. Harling, Hansen and Lindblad (2008) investigate changes in classification and framing in Swedish classrooms based on comparing recorded fragments of lessons from 1968 and 2003. In a mathematics classroom from 2003, they identify a pedagogy of weaker framing and classification, hence, a more invisible pedagogy. They also found more active students "that on one side challenge hierarchical power structures, expressing individuality and on the other side are much more visible and therefore more open for governing techniques" (p.16). The more "visible" students in 2003 are to a much greater degree responsible for their own successes and failures. There is indication of students' self-exclusion based on their participation, the students (dis)qualify themselves, both individually and as a collective as competent members.

## THEORETICAL BACKGROUND

The theoretical framework has to allow one to describe the emergence of disparity in terms of the relationship between everyday knowledge derived from the larger socio-cultural context and the type of knowledge that is related to success in a mathematics classroom. In addition it has to allow one to describe the implicit rules to which not all students have equal access. An obvious choice is to elaborate the notions of classification and framing (Bernstein, 1996). Differences in the instructional and regulative classroom rules can be described as variations of the type of knowledge which can be accessed and of the ways this knowledge is made accessible. The underlying principles can be captured by the strength of external and internal classification and framing. Weak internal classification indicates that there are weak boundaries between the mathematical sub-areas; weak external classification means that many connections are made to other disciplines or everyday practices. The degree of specialisation of the discourse can be captured by these categories. Framing refers to the nature of the control over the selection of the communication, its sequencing, its pacing, the evaluation criteria for the performance, and the social base which makes access to knowledge possible (Bernstein, 1996, p. 27). The students can have more or less control over these dimensions independently. According to Bernstein's theoretical analysis, variations of classification and framing relate to differential access to institutionalized knowledge.

The curriculum of the course taken by the students in the two Swedish classrooms can be characterised by a weak external classification. Reference to local, particular and situated everyday knowledge is frequently made, most commonly through contextualised mathematical tasks, metaphorical expressions and images. Empirical evidence suggests that the institutionalisation of segments from everyday discourse within school mathematical discourse has a tendency to allocate the everyday insertions to marginalised groups (see, for example, Cooper and Harries, 2009; Dowling, 1998). Boaler (1994) shows how female students are more likely to engage with aspects of "reality" when addressing contextualised tasks. Dowling's (1998, 2007) distinction between content and expression of a text, both being weakly or strongly institutionalised, allows for a description of the weakly classified hybrid discourse often found in school mathematics. He describes a relational space of four domains of action. Much of what constitutes the hybrid operates in a public domain of recontextualized domestic practices (Dowling, 1998). Recontextualization has to be understood as the process of subordinating one practice under the evaluation principles of another, as for example school mathematics. The contents of these four domains change. School mathematical practices strive for the esoteric domain of strongly institutionalised content and forms of expression. This leaves the question open as to how to conceptualise different forms in which the esoteric domain appears and whether these have a differential effect on students' participation. Also, what constitutes the public domain, consists in a set of activities that differ with respect to the evaluation principles. In engaging with the empirical material, we attempt to clarify and re-structure our language of description.

## FINDINGS

In the following we present an initial analysis of the first five lessons in both classrooms with a focus on episodes, in which the ground rules are developed and the evaluation criteria are discussed. All episodes, in which the criteria (for selection, pacing and evaluation) are explicitly addressed, were identified in the video recordings and selectively transcribed. In our presentation and discussion we also rely on our first impressions from the student interviews as well as on an initial analysis of the textbooks used in the two classrooms.

The students in the two classrooms under study are at the very beginning of their upper secondary education. One class with 32 students, is from an Arts Programme (Estetiska programmet, short: ES), the other, with 10 students, is from a special track aiming at the International Baccalaureat (IB). In the latter, English is used as the language of instruction. Both classes are engaged in the course A. In the IB track both course A and course B are compulsory, in the ES only course A. The IB group uses a textbook produced for the U.S. American market, while the ES textbook is designed for the A mathematics course within the Arts Programme.

Not surprisingly, there are differences between the mathematics A course in the two programmes revealed already in the first lessons. For example, both teachers stress the importance of the use of technology. In the ES class the students are told that “the calculator does not have to be of any advanced type”, but they should when buying it make sure that it “includes sine, cosine and tangent.” The teacher suggests that ”the Casio fx 82, for example, is a good calculator for a cheap price.” In contrast, in the IB group, the teacher reveals: “And then I will also give you your calculators…that is…are also for you to borrow and you may have them during three years cause it’s a requirement on the IB that you need to have a graphic calculator.”

### Setting the rules for the work and commenting on the criteria

In the course of the first five lessons in the IB class, the criteria are explicitly addressed only in the first lesson. The teacher hands out the official course plan from the school authority. This 2-page document contains short outcome-based descriptions, phrased as the ability to use the named repertoire of mathematical procedures and concepts in different situations. Under the heading “evaluation criteria” the criteria for each of the three pass levels are described. After illuminating the topic descriptions, the teacher addresses the evaluation criteria. While some students are looking at the handout and some are listening, the others look disengaged.

> IB: Lesson 1[2]
>
> (00:22:15) What about the grades… have you looked at the grading criteria that you have… you have it at the back [of the page]… we have pass ...pass with distinction and pass with special distinction. If you are aiming for... pass… and I hope that is your least

goal to get a pass…hopefully a higher grade and at least a pass should be your goal… then you are…or you must use appropriate concepts… learning what about what different things are called what different methods to use and how you solve problems. And for pass it's required that you can solve problems in one step…at least… and some oral and written reasoning of course… that is important that you can show your work both orally and in writing… it's difficult to know how students are reasoning sometimes if you don't see it… and then use of course mathematical terms and symbols and so on… and understand and know what that is. And that you also can differentiate between guesses and assumptions…when you are given facts you don't think you can solve… and some proof.

(00:24:18) To get pass with distinction…the biggest difference between pass and pass with distinction is that you can solve more types of problems… you can use… maybe use several methods to solve one problem… and you can connect different knowledge when you do your reasoning…and that you have a more deeper knowledge so that you can interpret different kinds of situations and when you solve your mathematical problems.

This expansion of the evaluation criteria matches largely what is stated in the text about pass and pass with distinction. According to the official interpretation of the Swedish grades, the pass level should not be taken as the minimum threshold but as the outcome expected to be reached by all students. This might be the reason why the teacher concentrates on elaborating the pass criteria and does not illuminate the criteria for the pass with special distinction. Being able to "differentiate between guesses and assumptions" and "some proof" can be seen to constitute an important part of the esoteric mathematical discourse. The inclusion of these in the pass criteria reflects the intention to include all students in this discourse.

(00:25:07) What is your goal… is that a question one is allowed to ask…have you thought about that…do you think about that now when you have started to take the different courses…what level do I want to achieve with my studies… do you think about that sometimes…would you…that is a good thing to think about because sometimes you have to choose…and think hard about what you want to achieve…or maybe I will put a pass with special distinction for everyone in the class…that would be nice… that would be good…mmm…

"Maybe I will put a pass with special distinction for everyone in the class…" is to be taken as encouragement (and not as a form of sarcasm), as such an outcome is indeed an intended possibility within the framework of the grading system. Then, after handing out the book, the teacher advises the students to look at the sections with the worked examples and start solving the tasks in the category "on your own".

(00:30:34): …just the odd ones and you will do one...three…five… and so on…because that's what you have answers to…just the odd ones… and then that will be good enough.

In the first lesson of the ES class, the teacher hands out a working plan for the term. For each week, it contains the page numbers of the textbook where the tasks to be dealt with can be found. The tasks in the book are labelled (by colour) as category A, B or C. In the chapters the group is dealing with within the first weeks, there are 25 A tasks, 12 B tasks and 2 C tasks in the chapter “tables and diagrams”, and 108 A tasks, 87 B tasks and 15 C tasks in the chapter “numbers in different forms”. In each chapter there is one task marked as an open task amongst the B tasks. On the first page in the textbook there is a short explanation:

> After the theory exposition follows a solved example that illuminates the theory. There are tasks at three different levels and of different character. Open tasks do not have one given answer and often require a mathematical discussion. A-tasks are standard tasks that generally can be solved in one step, while B tasks often require a solution in several steps. C tasks are more complex in their character and for solving them you need to, amongst others, apply mathematical knowledge from several areas.

In a meeting about organisational issues before the first lesson, the teacher handed out the textbooks and explained:

> “The book is grouped by levels and you will get a feeling which level suits you.”

In the first lesson, after a student calls the teacher and asks, the teacher expands on the principles of the task levels.

ES Lesson 1:

Teacher (00:07:33): So.

| | |
|---|---|
| Anna: | With these tasks... then... should one do A B or B C or only one of those |
| Teacher: | Ehm... |
| Anna: | So if we say that I have done type A tasks... will one then pass the test or does one need B tasks in order to get all tasks done [in the test]... because sometimes it is like this [?] tasks C... that is how it was in lower secondary...which come in the test... if I had done A I did not grasp what it was all about. |
| Teacher: | Nope... these are grouped by level of difficulty and if you go in the first place for solving A tasks and it works very well on the A tasks... then you probably don’t need to solve all A tasks... but then you go to a B task which is a bit harder and take up a challenge. |
| Anna: | Yes/ |
| Teacher: | /And the C tasks are of course a bit more tricky. |
| Anna: | Yes... |
| Teacher: | But the minimal requirement is that you have done A tasks to an extent where you feel that it works well with the A tasks. |

Another episode in which the criteria are discussed occurs in the second lesson. In this lesson, the students again work individually on the textbook tasks while the teacher walks around between the desks.

ES Lesson 2:

Thomas (00:33:52): You [name of the teacher] I’m wondering about something.

Teacher: Yes...

Valter: No we are wondering about something.

Teacher: Well we then will make a collective wondering/

Thomas: /Does one have to/

Valter: /Does one have to... it is A here and B and also C here does one have to do a task for all...

Teacher: Yes you should if you feel that you succeed very well with the A tasks then you will have to get up a level and do B tasks yes of course.

Thomas: But A counts as G [abbreviation for pass] B as VG [abbreviation for pass with distinction] and C as MVG [abbreviation for pass with special distinction]

Teacher: Yes roughly it can indicate that it is roughly that level of difficulty for the somewhat more difficult B tasks but one stretches oneself up a little extra when sorting out the B tasks...

Hannes: But [for the] B tasks it is unnatural.

Teacher: No of course you should sort them out.

Later in this lesson, the criteria for pass with special distinction are at issue:

Kerstin (01:03:57): Was one supposed do these…

Teacher: Not now we save these MVG [abbreviation for pass with special distinction] tasks and take them in a lump using an MVG lesson so to speak for those who really want to aim at MVG so that we can discuss them properly.

The teacher refers to a set of tasks given at the end of the chapter on a separate page. These tasks are all related to a non-mathematical topic. The page differs considerably in layout and design from the other pages in the book.

Finally, we found another incident when the criteria for the type of discourse that has to be produced for a pass with special distinction are touched upon:

ES Lesson 5:

Teacher (00:46:00): So what basic calculating operation is it that you have here.

Hannes: Yes it is minus then.

Teacher: Mm minus…so you end up at about pass and subtraction…so this is pass with distinction language…yes.

## DISCUSSION

In the first five lessons, weak framing is apparent in both classrooms, although to a different degree. In both groups, the students can choose their own pace for working with the tasks. Framing over the communication is weaker in the ES lessons. When solving tasks, students can choose, for example, whether they talk with their peers, get help from the teacher or work on their own. The option of openly discussing is usually not available in the IB lessons. In both groups, students have an apparent choice over the criteria as far as they can "choose" out of a given set of levels or grades to aim for, if they want to achieve more than pass.

According to Bernstein (1990), the relation between transmitters and acquirers is essentially (intrinsically) an asymmetric relation, but there are various strategies for disguising the asymmetry. Consequently, its realisation may be very complex in certain modalities (p.65). This is certainly the case for the realisation of the pedagogic practice as we observed it in the first five lessons in both classrooms. Although to a different degree, the instructional discourse is largely delegated to the textbooks. The most obvious difference between the textbooks is the levelled nature of the tasks in the book for the ES group and the absence of such levels in the one used in the IB class. It can be argued that in the ES class, the instructional discourse consists of two different discourses that operate in parallel and different students at the same time participate in those, based on their „choice". According to the teacher's advice, the sequencing rule entails that the different task levels have to be mastered one after the other. However, in the interviews, students reveal different strategies. Some choose to „jump" between the levels, that is, after trying some of the A tasks, they decide to deal with the B or C tasks immediately. In the book, the A, B, C tasks are grouped and the groups appear in each chapter in the order of the levels, and all tasks are numbered consecutively, that is, such "jumping" is not suggested. The tasks in the textbook used in the IB group are also numbered consecutively, suggesting a strong framing of the sequencing. If they follow the teacher's advice, all students will solve the same tasks, although at a different pace. The amount of tasks to be solved in each lesson is not specified in both classrooms. There is an apparent choice. Indeed, as we know from the interviews, some students from the ES group decide to solve mathematics tasks at home to make up for the time in the lessons, in which they talked to their classmates about issues note related to mathematics. In the IB group too, some students decide to work at home with the tasks. One student is much ahead.

In the ES class there is no teacher exposition, but the teacher assists the students while walking between the desks. As the textbook embodies the rules for evaluation and controls the selection and sequencing of the topics and tasks, it is not quite clear whether this is a pedagogic relation, in which the teacher is the "transmitter". However, it is in the end the teacher who evaluates the competence of the students. Some weeks after the start of the school year, the teacher conducted a test in the ES class. Thirteen students did not pass this test, two students achieved pass with special distinction, and one pass with distinction. The episodes quoted reveal the conscious attempts of some students to get their teacher to make the criteria explicit. But as can be seen from these episodes, the teacher's explanations remain vague. The responsibility for the decision about which tasks to solve is left to the students who have to evaluate their own performance by "getting a feeling" for the level of tasks that suits them. The choice for solving tasks that suit their own level turns out to amount to self-exclusion for many.

In the IB class there is more public discourse and, due to the small size of the group, conversations between the teacher and individual students are more likely to be audible for the others. At the start of each of the subsequent four lessons, the IB teacher expands for about 10 minutes on a topic. However, this expansion is not necessarily related to the tasks that the students then continue to solve (in ascending order of odd numbers) in the remaining time of the lessons. We do not yet have the results of the test, but we expect a much more uniform achievement distribution in this group. The teacher's expansion on the evaluation criteria at the beginning indicates a more visible pedagogy. But even though the criteria are explicit, they are not specific and not stated in relation to the different topics to be dealt with. The work set up in the subsequent lessons does not yet appear to contain opportunities to acquire all of the modes mentioned in the criteria (such as explaining the reasoning orally or in written form). The notion of proof is not specified in the textbook and the tasks do not invite alternative strategies and/or solutions.

In the ES programme, the construction principle behind the levels of tasks, as we analysed them, is not consistent and does not match the short description in the book. A difference is visible between the A/B level and the C tasks, as there is a mystification of this level, which is indicated by "tricky" as the teacher describes it, or "more complex" as to the explanation in the textbook. The more "tricky" level does not move into the esoteric domain, neither do the special tasks mentioned in the short episode about the criteria for pass with special distinction. But in one of the episodes quoted we find indication that the use of strongly institutionalised language is an evaluation principle.

The IB textbook contains more esoteric domain text, that is, the external classification of the content seems to be stronger than in the other book. But we see a mismatch between the criteria for the grades and the evaluation principles manifested in the book, that is, in the expected solutions to the odd numbered tasks which the students solve. In both classrooms we are faced with a curriculum (through the textbooks in use) that operates mostly within the public domain of recontextualized non-mathematical practices with occasional insertions from the esoteric domain. Consequently, the question must be asked of how a hierarchy within such a discourse is established in the interaction between students, teachers and the texts in use, which translates into a hierarchy of students in terms of their achievement. If there is no progression towards the esoteric, the distribution of achievement would be arbitrary in relation to the knowledge domains. Only an analysis of the conversations between teacher and students when s/he is walking around between the desks will show whether and how access to the esoteric domain is facilitated and how different students are positioned in this process.

In the two classrooms, much of the responsibility for their own learning is delegated to the students. The teacher is there as a resource for the students, and it is their own decision how to make use of it. Especially in the ES lessons, there is no obvious sanctioning of a lack of participation. Success is likely to depend largely on study habits. The students are faced with choices at more than one level. They choose which program to study at age 16-19. This has implications for which mathematics courses they are required to take. They choose which optional (further) mathematics courses – if any – to take. In both classrooms of the study the teachers present the issue of choosing levels to work at and which grade to aim for as a choice for the students to make. On which basis can such a choice be made? Choices are a reflection of the possibilities a practice apparently offers. Negative choices might be made, that is, based on things to avoid of which one actually is relaying on projected expectations. This seems to suggest that students with an advantaged background have more opportunities to make appropriate choices. Apparently free choice and self-selection can amount to self-exclusion.

## NOTES

1. See http://www.acadiau.ca/~cknippin/sd/index.html
2. Transcription conventions:

   … indicates a pause of less than 3 seconds. At the end of a turn it indicates an offer for the interlocutor to get a turn. Punctuation is introduced for improved readability.

   / indicates a cut.

   [?] indicates inaudible speech.

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