Towards a framework for analysing power relationships in small group discussions

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Based on an approach to power derived from the work of Michel Foucault, this paper describes the development of a framework for analysing power relationships in small groups of students working on collaborative activities. Student-student interactions were observed, videotaped and transcribed. Key features that emerged were techniques used to control the flow of the discourse in the group and behaviours which influenced the mathematical knowledge constructed. Other factors include body language and the control of resources.

Introduction

This paper describes the development of a framework for analysing power relations in small groups of students working on collaborative activities independently of a teacher.

Collaborative learning—students working together, usually in small groups, on a shared activity and with a common goal—has been widely recommended in recent years as a strategy to enhance mathematics learning for all students, especially girls (e.g., Cordeau, 1995; Jacobs, 1994; Morrow & Morrow, 1996; Solar, 1995). I am beginning a study which will investigate the effectiveness of this strategy, with the aim of describing optimal conditions for its use. My principal research question asks how students experience learning mathematics in collaborative settings and how the gender of the student impacts on, and is affected by, this experience. In particular, I am seeking to find out how students working in collaborative groups interact with one another, and how they construct themselves as learners of mathematics. The study is focused on senior students (mainly in Year 11) at the stage where they are beginning calculus, because it is around this time that they make key decisions on course selection affecting their post-school options, and their future relationship to mathematics. These key decisions are predicated on students' evolving constructions of themselves as learners of mathematics.

In this paper, I analyse data from an ethnographic case study of a single classroom using collaborative learning activities, undertaken as a preliminary to the main study. Naturalistic inquiry methods were used in order to disturb normal classroom processes as little as possible. Data included videotapes of all lessons for a three-week period, field notes from classroom observations, and interviews with the teacher and target students. The aim was to assess the adequacy of the data-gathering techniques for answering the central questions of the main study and to explore possible frameworks for data analysis.

Feminist theory, and my own experience, suggest that a study exploring gender effects in collaborative learning needs to take into account the exercise of power within student groups, and to investigate the potential of these to influence learning outcomes.

Gender, power and knowledge

What is power and how can it be investigated?

My starting point is an understanding of the nature of power, and an approach to analysing power relations, proposed by Michel Foucault. Foucault defined power as "a mode of action which does not act directly and immediately on others. Instead it acts upon their actions ... on existing actions or on those which may arise in the present or in the future" (Foucault, 1982 p. 220). Foucault stressed that power is exercised through individuals and must be studied at the individual level: "What characterizes the power we are analyzing is that it brings into play relations between individuals (or between groups)." (Foucault, 1982 p. 217).

The questions most often asked about power deal with its nature and sources, (the "What?" and the "Why?" of power). Foucault, on the other hand, chose to ask about the "How?" of power. The shift in focus, from theorising about the sources of power to asking how it is exercised, opens up the possibility of empirical investigation. This does

not mean that questions of the nature and sources of power are ignored. On the contrary, empirical evidence of the exercise of power may provide data for investigating these questions and so help us understand how power functions in different contexts.

Foucault claimed that power in modern society is not a commodity, which some possess and others do not. Rather, it is jointly constructed, a structure of relationships which shapes people's actions. "Power exists only when put into action." (Foucault, 1982 p. 219). Furthermore, the effects of power are not all negative: "it induces pleasure, forms knowledge, produces discourse. It needs to be considered as a productive network which runs through the whole social body, much more than as a negative instance whose function is repression." (Foucault, 1980 p. 119). This point is of particular importance when we are studying the classroom, where the formation or construction of knowledge is the object of the enterprise.

Power relationships and the construction of knowledge

Systematic observation is needed to clarify the operation of power in pedagogy (Gore, 1997). It is particularly important to investigate in this way an innovative teaching practice such as collaborative learning, which involves a shift in traditional classroom power relationships. By relinquishing some control over classroom interactions, the teacher is sharing power with the students. I claim that the ways in which power is exercised among a group of students working together on a mathematical activity can influence the construction of knowledge within the group, both the personal understandings of mathematics constructed by each member of the group, and the knowledge which becomes "taken-as-shared" within the group.

For example, a student who is able to control the direction of the discourse within a group has great potential to influence the group's progress. Watson and Chick (1997) give examples of the "charismatic intellectual", with both cognitive and leadership abilities, who is able to lift the performance of an entire group, but point out that leadership skills without cognitive capability could have the effect of lowering the performance. If a student is able to command the attention of the rest of the group to his or her ideas, they may be taken up by the group in preference to more profitable ideas. Here again, Watson and Chick give examples in which one student's persistence with a wrong idea pulls down their whole group's performance on a task.

The extent of a student's influence on a group's discussions has the potential to affect their self-perception of mathematical competence and feeling of ownership of the mathematics constructed; and also how their capabilities are perceived by others. Thus the exercise of power within small groups is potentially important in a study of how students construct themselves as learners of mathematics.

Gender and power

Much of the research on gender, in mathematics education and in other fields, has focused on investigating gender differences, and developing strategies to minimise or eliminate them. But as Crawford (1995) points out, concentrating on difference may result in a failure to confront underlying issues of power, status and domination. Analysis of male-female power relations has been a major emphasis of feminist studies, revealing the many ways in which women's interests are subordinated to those of men at both the systemic and the individual level (see e.g., Eisenstein, 1984; Grosz, 1988).

Observation of young children has shown how the social construction of gender is shaped by the discourse of powerful and dominant masculinity (Clark, 1989; Davies, 1989). Gendered patterns in conversational interaction have also been documented. Malz and Borker (1982) observed that in cross-sex conversations males are more likely to interrupt; to challenge or dispute another person's utterances; to ignore what the other said; and to try to control the topic of conversation. They explain these differences as due to cultural differences in communication patterns produced in distinct male and female subcultures. This view has been widely criticised as representing a failure to recognise the influence of power differentials (Crawford, 1995). "The two-cultures approach fails

to theorise how power relations at the structural level are recreated and maintained at the interactional level" (Crawford, 1995 p. 96) Crawford suggests that "those who want to understand how the gender system is recreated and maintained are wise to focus on language use. Attention to language practices can be a crucial way of unmasking the politics of everyday life" (Crawford, 1995 p. 180).

Perspectives on power in the classroom

Studies of teacher-student power

A Foucauldian view of classroom power sees it as a relationship between the participants, claiming that there can be no power relations without the possibility of resistance. Manke (1997) has adopted an interactive conception of power, taking into account actions of the students as well as the teacher. Her focus, however, is on the struggle for power between teacher and students, and the strategies adopted by teachers to achieve their objectives in the classroom. In a current project, Gore (1995; 1997) is using categories derived from Foucault's writings to analyse the practice of power in a variety of educational settings, including some described as radical. But so far no data related to male-female interactions within collaborative groups has been reported.

Studies of interaction in mathematics classrooms, including those dealing with gender issues (Koehler, 1990; Leder, 1990), have not had power relations as an explicit focus, although some of their findings could be interpreted as indicating the exercise of power by male students. Again, most of these have dealt with teacher-student interactions, finding fairly consistent differences in teachers' interactions with male and female students, favouring the learning of males. Leder noted "the pervasiveness of males' domination of teacher attention" (Leder, 1990 p. 165). Jungwirth (1991) found gender-related modifications of "typical" teacher-student interaction patterns, and argued that the effect of these was the interactive constitution of mathematical competence on the part of boys and of mathematical incompetence on the part of girls.

Power relationships within collaborative groups

In the studies discussed above, the style of classroom teaching observed did not permit an analysis of interactions between male and female students. Forgasz (1995a; 1995b), in a study of group work in two Year 7 classrooms, did study groups as they worked together. Her observations included disruptive behaviour by boys, occasional abusive behaviour by boys towards girls, and boys adopting work-avoidance tactics, leaving the girls in their group to do most of the work for which all group members would receive credit. All of these could be interpreted as ways of exercising power. Forgasz, however, did not explicitly address power issues, choosing to focus instead on autonomous learning behaviours and attributions for success and failure.

Procedures and results

Sources of data

The study was conducted in a government high school in Sydney, and involved a Year 11 class doing introductory work on calculus. A series of lessons was videotaped, with the camera trained on small groups when appropriate. Field notes and student worksheets supplemented the videotape record. "Rich" transcripts of the videotapes were prepared, including descriptions of actions, gestures, facial expressions or voice intonations which were judged to be relevant. To validate my judgements about what is relevant, a colleague was asked to view a sample of the taped lessons and comment on the information included in, or omitted from, the transcripts.

Indicators of the exercise of power

In seeking to develop a framework for analysis grounded in the data, my starting point was to study and reflect on the transcripts and to re-view the videotapes, to get a

feeling for the power relations involved. There is always a risk in research of finding what one is looking for—simply confirming one's personal biases. As the researcher who collects and transcribes the data, I cannot avoid being aware of both the genders and the personalities of the students, and knew that I needed to guard against the risk of prejudging some important issues. I therefore aimed to develop a set of criteria for identifying the exercise of power which could be applied to rich transcripts by someone with no information about the gender of the protagonists. This would make it possible for a colleague to check the reliability of my analysis.

I was able to classify significant influences under three main headings: control of the flow of the discourse, construction of knowledge and use of resources. Other headings which I considered included the allocation and use of space and time, but few instances of students' use of these have been observed in the data analysed so far.

Control of the flow of discourse

The main way in which a student can control the discourse in a group is by influencing the topic to be discussed, including the timing of transitions from one topic to another. I found that the study of the resolution of uncertainty by Clarke and Helme (1997), provided a useful approach to this analysis. Clarke and Helme proposed that a mathematics lesson may be considered as consisting of many episodes, each defined by a consistent purpose such as the solving of a particular problem. Each episode is made up of one or more negotiative events associated with identification of, and attempts to resolve, a sub-goal. Negotiative events are usually initiated by an expression of uncertainty in some form, such as the asking of a question.

In practice, the transcripts I was analysing did not divide neatly into sequences of negotiative events, each satisfactorily resolved before the group moved on to the next. The negotiation was often inconclusive, or interrupted by off-task talk. Nevertheless, negotiative events appear to be a key unit for analysis, because transitions from one to the next mark the progress of a group's work on an activity. A student who enacts closure of one negotiative event and initiates the next to a very large extent controls the discourse.

A study of the transcripts revealed the following occurrences, representing ways in which students act to control or influence the direction and flow of group discourse:

- Initiates a negotiative event.
- Initiates off-task talk.
- Rejects or ignores off-task talk (usually by continuing the negotiative event).
- Claims the attention of the group by gesture, emphatic speech or other means.

Note that terminating a negotiative event is not a very powerful move. It is never clear that an event has ended until the next event, or discussion of some other topic, is established. Until then, although the group may appear to have reached agreement, it is always possible for one member to have a change of mind and resume negotiation. The sequence of negotiative events is thus interactively constituted by all participants in the discussion. One member can only control the proceedings if the others permit it.

Construction of knowledge

The sequence of negotiative events tells only part of the story. In a mathematics lesson, what is important is the mathematical ideas. We need to look at the influence of different students on the knowledge that is constructed or negotiated. For this, we must turn attention to individual turns within negotiative events. A study of the transcripts revealed the following types of moves which could be significant:

- Introduces a new idea, or makes a suggestion about solving the problem.
- Rejects an idea or suggestion.
- Accepts an idea or suggestion.
- Asks for an explanation or justification.
- Gives an explanation or justification.

The objective of a negotiative event is the resolution of uncertainty. The key to this may be contained in an idea suggested by one group member, but what really counts is its

reception by the rest of the group. No matter how good the idea, if the group reject it, it will not advance their endeavour. This means that successful rejection moves are powerful. Ignoring is a form of rejection—collective rejection by the rest of the group. Being ignored can signify an individual's lack of power within the group.

Acceptance moves need to be closely examined. There is a big difference between positive support or endorsement of a suggestion, which causes the group to take it up and is clearly an exercise of power, and uncritical acquiescence to the ideas of an influential peer (like the "charismatic intellectual" described by Watson and Chick (1997)). A good idea may be accepted because of the status of its originator, without the rest of the group understanding its significance or being able to use it independently. Equally, a false or misleading idea may be accepted, and cause a time-wasting digression, or even failure of the group to complete the task satisfactorily. Such occurrences are exercises of power by the student who originated the idea. Discrimination between weak and powerful acceptance moves requires careful interpretation of the transcript and possibly a return to the original tape. The manner of saying and doing things can be as important as what is said or done: confident and tentative behaviours can have very different effects.

Asking for an explanation or justification can be an important and powerful move—almost equivalent to initiating a new negotiative event—but again this depends on the manner of asking, whether it is challenging or simply seeking help or clarification.

Finally, giving an explanation or justification is powerful if it convinces the hearers. An additional coding category is needed for the nature of the authority which is found to be convincing: appeal to the teacher, the textbook, or an established formula or rule (reliance on external authority), or the use of a rational argument constructed by the student (reliance on internal authority).

Use of resources

Resources available to a group to help them complete a mathematical task may include worksheets, textbooks, models, calculators, drawing implements or graph paper. Some of these may need to be shared. Observation shows that resources are used in a variety of ways to support control of discourse and construction of knowledge.

If there is a single copy of a worksheet or other resource, the student who has it is at an advantage in controlling the discourse. Conversely, passing a worksheet to another student can be a way of handing over control. Occasionally, one student hands over a worksheet to another but then dictates to the other what to write, in this way maintaining control, and indeed dominating the other. A gesture such as pointing to a model, diagram or graph can be a way of drawing attention to what one is saying, that is, a way of exercising power. But it may also be a device to help explain one's ideas, or an aid to clarifying one's thoughts, and so can support the construction of knowledge without the exercise of power over others.

Illustrative examples

Excerpt 1

R and N were working together on a card-sorting task: matching a set of functions with their derivatives. R had begun by arranging the cards in two columns on the table between them, the (numbered) function cards in numerical order and the derivative cards in random order. The second function, $3x^{-2}$, caused difficulty. They had never before differentiated a negative power, and initially selected the wrong card for this place. At the beginning of the excerpt, R had just terminated a negotiative event by moving the derivative card originally put in second place, into a position lower down.

Explanation of symbols used in the transcripts:

→	points to initiation of a negotiative event or off-task talk
(...)	indicates an indecipherable utterance
(what)	indicates the best guess for an indistinct utterance
[ ]	observations from videotape or field notes

→ 1 R: So which one is this? [Points to place opposite second function card, now vacant.]
2 N: Negative six. [Moves a card hesitantly towards the blank position, but does not put it in place]
3 R: Negative six. [Looks at the card N has suggested.] No it should have only x.
4 N: This one? [indicates a derivative card]
5 R: (What about) this one? [points to a different card.]
6 [Both study the cards for several seconds. R scratches his brow.]
7 R: Minus n uh minus one [emphasis] which is minus three, oh yeah. [Moves a card from near the bottom of the derivatives column into second place.]
8 R: Yeah, that one goes here.
→ 9 R: These two, and these two, these two, these two, these two, and this one is there.[Checks the pairs already in place]

Control of discourse: This excerpt consists of a single negotiative event, initiated by R in turn 1, and terminated by R with the initiation of a new event in turn 9. During the whole of the pair's work on the card-sorting task, which lasted about seven minutes, twelve negotiative events and two instances of off-task talk were counted, all initiated by R. This is a fairly extreme example of one partner completely dominating the discourse.
Construction of knowledge: In turns 2 and 4, N made tentative suggestions, which were immediately rejected by R. In turn 7, R realised that they had been making an error in applying rule they had just learned. R gave a brief explanation, drew attention to it by speaking with emphasis, added a confirming "oh yeah", moved the correct card into place and confirmed acceptance of the idea (turn 8) without checking with N. Note that the manner of speaking and acting is as important as what is said and done. N behaved tentatively, whereas R generally behaved with confidence. These differences in manner contributed to R's domination of the proceedings.
Use of resources: R took control from the start of the activity, by opening the envelope and laying out the cards. R also moved the cards into place. N did no more than point to cards or move one hesitantly towards a position, but never actually put one in place.

Excerpt 2

The class were working in pairs, with two pairs facing one another at each table. B and L had just resolved a disagreement. The shared worksheet was in front of B.

→ 1 B: Okay, then we've got (...) [B mutters mainly to self. L watches.]
2 B: (...) and nine x minus sixteen x plus six. There you go. [passes worksheet to L. Glances towards researcher (off camera) — looking for approval?]
3 [The worksheet now lies on the table between B and L. L looks at B's working and nods, then leans back, putting both hands to head.]
→ 4 L: I'm so tired, man.
→ 5 B: Okay, what's the rest of the question?
6 [L leans forward again and points to the worksheet.] What's the gradient of the curve at one.
7 [B pulls worksheet closer again and picks up pen.]
8 L: How do you do that?
9 B: Sub one in as x.
10 L: I thought it was something to do with x.
→ 11 [B leans forward to see what the pair sitting opposite them are doing.]
... (some off-task talk with the students opposite, sustained by L.)
20 [B is staring at the board.]
→ 21 L: Substitute x is one yeah. Wouldn't that still be the same thing?
22 B: I don't know. I think I'll go check my notes.
23 [B gets out notes and flips through the pages. L sits back, yawns, looks bored]

Control of discourse: In turn 1, B initiated a negotiative event—differentiating the polynomial they had just simplified. L terminated the event (turn 3) by nodding and disengaging from the discussion. L then tried to introduce off-task talk (turn 4). B rejected this invitation by initiating a new negotiative event in turn 5. This appeared to end at turn 10, when L again gave minimal assent to B's answer, and they began to talk about other things. B initiated this off-task talk, but L joined in and sustained it. B tried to terminate the off-task talk by returning to work (turn 20). It seems that both L and B felt uncertain about the conclusion agreed on earlier, as L reintroduced the question, beginning a new negotiative event (turn 21), and B expressed uncertainty (turn 22). They reached no conclusion. B searched through notes and L "switched off". Note L's use of body language to signal engagement or disengagement from the activity (turns 3, 6, 23).

Control of the discourse passed from B to L and back again. L showed little interest in the task and made little effort to understand the details. L tried to introduce and sustain off-task talk, but moments later switched to thinking about the task again. B, on the other hand, did appear to want to engage with the task, but lacked confidence that the idea proposed was correct, and resorted to searching through notes for confirmation. Neither L nor the students opposite responded in any way to B's expression of doubt.

Construction of knowledge: Very little knowledge was constructed in this excerpt. It is also notable that there were few powerful moves. No explanations or justifications were given and no statements were rejected. L acquiesced uncritically to B's ideas (turns 3 and 10) and asked how to do it (turn 8). B answered with apparent confidence (turn 9), but seemed to find L's question in turn 21 challenging, and responded by expressing doubt. B then sought confirmation from an external authority (the notes).

Use of resources: The paper on which the problem was written was passed to and fro, as each tried to push the responsibility onto the other.

Discussion and conclusion

The most important indicators of the exercise of power in small group discussions appear to be the initiation of a new topic, either a negotiative event or off-task talk; and the endorsement, rejection or challenge of a statement by another student. Other indicators, such as gestures, body language, and use of resources have a modulating effect on these.

An interesting insight that has emerged from my analysis is an apparent parallel between powerful student moves and the traditional teacher's role. In teacher-centred classrooms, discourse has been observed to follow the tripartite initiation-response-feedback (I-R-F) pattern: the teacher asks a question, a student answers, and the teacher gives feedback by evaluating the correctness of the answer (Stubbs, 1983). A key characteristic of this pattern is that the teacher already knows the answer to the question.

We do not expect to find the I-R-F pattern in student-student interaction, except perhaps in the case of peer tutoring, where one student is recognised as more capable and has been explicitly assigned a "teacher" role. However, it is noteworthy that some indicators of student power or control carry echoes of the teacher role: the initiation of a new negotiative event has much in common with the initiation turn in the tripartite pattern, and the act of endorsing, rejecting or asking for an explanation is very similar to the feedback turn. Thus the student exercising power in either of these ways is, to some extent, behaving like a teacher.

In the first excerpt, R assumed control from the start of the activity. The first three turns of the excerpt (186-188) are a classic I-R-F sequence, even though R did not at that point know the correct answer to the question. In the other excerpt, control of the discourse was contested, and the parallel with the I-R-F pattern was not so clear.

The ideas presented here constitute the starting point for a framework for analysing power relations in collaborative groups. This now needs to be tested by applying it to more data, including transcripts of collaborative interactions from classrooms where the types of activities differ from those in the class described here. This will allow the descriptions of the indicators of power to be refined, and more added, as necessary.

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