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ABSTRACT

This paper focused on student participation in controlling classroom activity. Issue-Based Discussion is described and promoted as a form of activity that can be used in the classroom to both enculturate students into the ready-made-culture of modern, western science and empower them to share in the control of activity as they participate in a culture-in-the-making. An analysis of an exemplary case of whole-class, issue-based discussion shows how this kind of discussion can support a balance between teacher and student control of activity. This discussion occurred in a seventh-grade general science class consisting of 30 students in Oakland, California. Results suggest a fairly high degree of student control. In addition, the analysis of the co-text surrounding student and teacher requests and statement indicates that while students and teacher contributed to controlling the discussion, they did so from different roles with different investments. (Author/MKR)

Issue-Based Discussion in a Classroom of Designers

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Abstract

This paper is focused on student participation in controlling classroom activity. Issue-Based Discussion is described and promoted as a form of activity that can be used in the classroom to both enculturate students into the ready-made-culture of modern, western science and empower them to share in the control of activity as they participate in a culture-in-the-making. An analysis of an exemplary case of whole-class, issue-based discussion shows how this kind of discussion can support a balance between teacher and student control of activity.

Introduction

Many contemporary educators, particularly those with a social-constructivist bent, would agree with the following two educational goals: (a) students should be enculturated into a ready-made culture (e.g. science students should learn the facts and artifacts of science including how to think and talk science), and (b) students should be empowered to control their own activity within a culture-in-the-making. Unfortunately, in practice, these goals often come into conflict. Many strategies for enculturating students into a ready-made culture deny them opportunities to control classroom activity; many strategies for supporting student control of activity provide few opportunities for students to learn the facts and artifacts of a culture; many strategies designed to do both result in what Edwards and Mercer (1987) call the teacher's dilemma. Driver poses the dilemma as follows:

> On the one hand pupils are expected to explore a phenomenon for themselves, collect data and make inferences based on it; on the other hand this process is intended to lead to the currently accepted law or principle. (Driver , 1983, p. 3).

In the classroom described in this paper, the teachers (Angela Grimes and I) tried to achieve both an enculturation and an empowerment goal while avoiding this dilemma by having students participate in a shared design task. In contrast to a combined enculturation-empowerment goal of having students rediscover currently accepted laws or principles, we had complementary enculturation and empowerment goals. The enculturation goal was for students to engage in scientific activities like asking questions, taking positions, constructing arguments, doing book research, and using currently accepted scientific facts, laws, and principles to support their arguments. The empowerment goal was for students to share in the control of all phases of a purposeful activity.

This paper is focused on how the goal of having students share in the control of activity was enacted during a whole-class discussion. Whole-class discussion was selected as a data source because it provides an accessible window into a classroom and is a pervasive and well studied form of classroom activity (for examples see Lemke, 1990; Mehan, 1979; Sinclair & Coulthard, 1975; Cazden, 1988; Edwards & Mercer, 1987; Wells, 1993; Thébeırge 1994). Lemke (1990) describes a set of discussion activity types that vary along several dimensions, one of which is relative degree of student and teacher control. Three of these activity types are relevant here.

Triadic Dialogue is a highly constrained activity type with the following basic structure:

teacher:	asks "fact" question and calls on student
student:	answers question
teacher:	evaluates the answer

This form of dialogue, also referred to as IRF (Sinclair & Coulthard, 1975) and IRE (Mehan, 1979), is a very common type of classroom discussion (Lemke, 1990; Mehan, 1979; Sinclair & Coulthard, 1975; Cazden, 1988; Edwards & Mercer, 1987; Wells, 1993). In this activity type, teachers ask questions and students provide answers.

Although this activity requires active student participation and can be a powerful tool for introducing students to the semantics and thematics of a domain, it also leads to an almost total lack of student control (Edwards & Mercer, 1987; Lemke, 1990). According to Lemke (1990), control of a discussion can be imposed using both structural and thematic tactics. He defines structural tactics as "those that manipulate the activity structure itself" and thematic tactics as those that "manipulate the actual topical content of what is said within the course of that activity" (p. 66). Within the Triadic Dialogue the initiating fact question fully specifies both the structure and the thematic topic of the exchange. Having been nominated to speak, a student's freedom is limited to constructing one of a variety of ways of stating the correct thematic answer. The structure of this activity type is also predicated by the teachers initiating question. Directing a question at students sets them up to answer, and since both parties assume the teacher knows the answer, the initiation also sets up the teacher's evaluation move.

Despite acknowledging this criticism of Triadic Dialogue as limiting student involvement in the control of activity, Wells (1993) argues that there are compelling reasons for seeing Triadic Dialogue as "the prototypical Action structure for achieving the overarching goals of education" (p. 35) which he describes as "cultural reproduction and individual development" (p. 3). While I agree with Wells that Triadic Dialogue can be useful for certain educational goals, I also believe that forms of activity that give students opportunities to share control with their teachers are essential to empowering students.

Lemke (1990) has identified student-to-student Cross-Discussion and True Dialogue as promising forms of discourse for providing students with opportunities to play a more active role in controlling activity in the classroom. True Dialogue, also referred to as teacher-centered dialogue (Théberge, 1994), is less constrained than Triadic Dialogue and has with the following structure:

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teacher:     asks question with no presumed answer
student:     answers question
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While structurally similar to Triadic Dialogue, the function of the initiating question is very different here. Compared to Triadic Dialogue, the initiating question in teacher-centered dialogue also functions as teacher control of student participation but, because no correct answer is presumed, moves student freedom up a level from different ways of stating the correct answer to stating differing answers of an expected type. Also, as noted by Théberge (1995), this activity type provides the teacher with opportunities to scaffold student expression by enabling them to enter into Cross-Discussions.

Cross-Discussion is much less constrained than any of the other activity types discussed by Lemke (1990). He defines Cross-Discussion as, "A dialogue pattern in which students speak directly to one another about the subject matter, and the teacher acts as a moderator or equal participant without special speaking rights" (p. 217). This activity type can be represented as:

[ ]: { }

indicating that either a teacher or student can initiate any turn and use that turn in a variety of ways constrained only by general community expectations. This activity type gives students the opportunity to participate in a greater variety of discourse activities than any of the other structures described by Lemke. In Cross-Discussions described by Théberge (1995) "students responded to each other directly, asked one another to clarify their points, questioned one another's reasoning and epistemologies, challenged peers claims, offered alternative theories, or 'ran with' an idea brainstorming collectively about its implication" (p. 17). Cross-Discussion also gives teachers the opportunity to model roles that students can practice in the same context in which they observed them.

This paper introduces and describes the structure (i.e. who can say what, to whom, when, and how) and function (i.e. the purpose of the activity) of*Issue-Based Discussion* . I claim that Issue-Based Discussion (IBD) is a type of discussion common among designers, scientists, and just plain folk that can be used to provide students with opportunities to share control of classroom activity while also learning the tools of a ready-made culture. In the classroom discussed here, IBD took the form of a hybrid of Cross-Discussion and True Dialogue. The function of this type of discourse is to resolve an issue or decision. The core moves in an IBD activity structure are stating issues, stating positions that respond to an issue, and stating reasons that support or counter a position. An episode of IBD is initiated by a statement of the issue and closed by some statement of resolution or continuance of the issue. Statement of the issue may be followed by an explicit request for positions and zero or more position-reason sequences. Each position-reason sequence contains a position and a reason in support of the position typically spoken by the same individual. A position-reason sequence may also include an explicit request for a reason. In addition to issue statements and position-reason sequences, IBDs also may include elaboration sequences. Each of these consists of a request for elaboration in response to a preceding turn, typically the directly preceding turn, and a response to the request most often by the person who spoke the preceding turn. Evaluation of any past move is an additional optional move. As an example of IBD, consider the following hypothetical discussion fragment.

Ann: Where should we go to eat?

Christine: How about Cafe Vin? The food's good and the price is right.

Drew: That's OK by me. Italian restaurants always have vegetarian food.

Ann: OK, Cafe Vin it is.

In this example Ann raises an issue, Christine and Drew both reply with their positions and their reasons for their positions, and Ann declares the issue resolved.

Methods

Context of the Study

An analysis of an exemplary case of whole-class discussion serves as the primary data source for this paper. This discussion occurred about midway through a full-year, seventh-grade, general-science class in Oakland, CA co-taught by Angela Grimes, an Oakland Public School teacher, and myself. The class consisted of 30 students, including 10 Caucasian Americans, 7 African Americans, 6 Asian Americans, 3 Latino Americans, and 4 others. The class was a full-year elective general-science class that met for 55 minutes a day 5 days a week.

The theme of the class was interdependence within and between ecosystems including three sub-topics—abiotic features of ecosystems, biotic features of ecosystems, and human impact on ecosystems. These topics were explored in the context of a year-long student project. The students' project was to design a Biosphere. The final product included interdependence webs specifying the connections between the biotic and abiotic components of the Biosphere and design documents that specified how the Biosphere would be constructed and maintained.

The student were divided into two kinds of groups. There were five design teams, each consisting of six members. Each design team was focused on one aspect of the design of the Biosphere and was responsible for making design decisions (e.g., how tall the structure would be, where each ecosystem would be located relative to each other, etc.). There were six research groups, each consisting of five members, that were responsible for learning about their ecosystems and researching and presenting information to inform the design teams. In most cases the design teams had one member from each of the research groups.

The design project was used to organize all aspects of classroom activity. For example, the second sub-topic was motivated by the following question "What biotic features of your ecosystem will need to be included in our Biosphere?" The students broke this question down into many smaller ones including "what plants should we include?" and "what animals should we include?" These questions in turn led to several whole-class discussions about interdependence between plants and animals which in turn motivated the students' production of interdependence webs for each of their ecosystems. Issue-Based Discussions occurred as students identified and tried to resolve design issues with each other and their teachers.

Several resources were provided as part of the classroom learning environment by the FCL project[1]. These resources included a set of books and articles about topics of relevance to the Biosphere design project, six Apple Macintosh computers, word processing and drawing software, a file server, a printer, and electronic mail software

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[1] Under the direction of Ann Brown and Joe Campione, Graduate School of Education, UC Berkeley.

linking the classroom to a wider community including experts at the University of California, Berkeley. Several of these experts as well as some non-UCB experts also visited the classroom on a number occasions throughout the year.

Data Analysis and Coding Scheme

Potential data sources included audio- and video-tape of small-group and whole-class discussions, student notebooks, and the products of student design. Approximately 15 hours of issue-based discussion have been transcribed. The transcript analyzed here is of a 45 minute discussion about potential locations for the Biosphere. Each conversational turn in this discussion was coded according to the function of the turn in the construction of an issue-based network. The coding categories are listed below in Table 1. The top-level codes specify the function of the move in general conversational terms. The second-level codes, except those further specifying conversation management, specify the function of the move in terms of the main components of Issue-Based Discussions. The second-level conversation-management codes differentiate between passing-off which indicates nominating a speaker to talk and prompting passing-off which indicates reminding a speaker to nominate the next speaker to talk.

Table 1

Top-Level Code	Second-Level Code	Example
Statement	Issue	...let's decide where it's going to be...
	Position	I think we should put it in the desert.
	Reason	Because in the desert you can, it's hot, we can just make it colder in the biosphere. But it would be harder to make it hotter the same way the sun does.
Request	Issue	So my question to you is, is there anything that you need to talk about besides these two things with people in other groups?
	Position	First question is where to put the biosphere?
	Reason	What is your reason for wanting it in the desert as opposed to anywhere else?
Evaluate	Issue, Position, or Reason	But I like the idea, too, about like in Costa Rica, I think that would be good.
Manage Conversation	Pass-off	Go ahead Alex.
	Prompt Passing-off	I don't know who talked last, but somebody pass off to someone else.

The transcript coded according to this scheme has been used to tabulate the frequency with which teachers and students performed the various conversational moves, to identify commonly occurring student-student and teacher-student exchanges, and to make inferences about students' and teachers' roles in controlling the activity.

Results

Move and Exchange Frequency Analysis

Table 2 illustrates the frequency with which teachers and students made requests, statements, and evaluations.

Table 2

	Teachers	Students
Requests	26	6
Statements	27	50
Evaluations	4	6
Total	57	62

As in typical Triadic Dialogue classrooms teachers asked most of the questions. Unlike typical classrooms, students made the most total moves. Also unlike results from typical Triadic Dialogue classrooms, there were relatively few evaluation moves and students performed these moves with a slightly greater frequency than teachers. Table 2 also demonstrates that student statements were not always in response to a teacher request, but it does not indicate how many were not, nor what these statements were in response to.

An analysis of the 50 two-turn exchanges where a student statement was the second move indicates that of these 50 statements, 22 followed a student statement, 15 followed a teacher request, 10 followed a teacher statement, and 3 followed a student request. All 15 student statements that followed a teacher question were statements of the specific types requested by the teacher. The 22 student statements that followed other student statements were distributed equally between positions or reasons that followed other positions or reasons. The 10 student statements that followed teacher statements were also mostly positions or reasons that followed other positions or reasons.

Finally, the 3 student requests that were followed by student positions consisted of one request for an elaboration of a proposal followed by an elaboration of a proposal and two requests for an elaboration of a reason both of which were followed by the requested elaborations. While three turn exchanges were not analyzed fully, it is worth noting that there was not one case where a teacher asked a question, a student answered it, and the teacher evaluated the answer.

In summary, the move and exchange frequency results indicate that 65% of statements about issues, positions, and reasons raised in this discussion were raised by students and that 30% of the student-statements followed teacher requests.

Analysis of Student and Teacher Roles and Investments

The frequency results based on the presented coding scheme indicate that students made statements in response to both teacher questions and statements as well as to student statements. This suggests that the teachers' roles in controlling the discussion were as questioners and participants while the students controlled the discussion primarily as participants. This interpretation, while accurate, is incomplete. Issue-Based Discussion in the context of design has been defined elsewhere as a "conversation between stakeholders." (Conklin & Bergman, 1988, p. 140). Part of the power of this type of discussion in the classroom described here seems to stem from the fact that the teachers did *not* act as stakeholders but rather as discussion chairs. In this role they asked questions as structural prompts to ensure that multiple positions were raised in response to each issue, that each position was backed by at least one reason, and that student-statements were clear and complete. The following example of a teacher's request for an elaboration of a reason followed by a student's elaboration of a reason typifies this kind of structural prompting.

Teacher: What is your reason for wanting it in the desert as opposed to anywhere else?

Student: Because in the desert you can, it's hot, we can just make it colder in the biosphere. But it would be harder to make it hotter the same way the sun does.

The teachers also used statements to summarize, highlight, and introduce issues, positions, and reasons they felt had importance during various phases of the discussion. The following teacher-student interaction is illustrative of this use of a statement by a teacher.

Teacher: Okay, I'm going to, if I may play devil's advocate a bit, Ann brought up a good point that I think I would like to take one step further. And I would also like to make a comment about Florida and not just Florida, persay, but also about Hawaii. One, if this is a closed off environment, does it really matter that Hawaii has a rain forest and has a seashore and has an ocean as does the other places? That's one question. The second thing is the coasts of Florida and Hawaii have some major problems: hurricanes, tornadoes, tidal waves, etc. Which you could build this beautiful place and you could have it wiped out every season. Okay, so there's that issue. If you want to comment on my first issue, sir?

Student: Me? Well, I just think it would be easier and less costly to be close to the water. And even if it was like by not that much like, two miles away from it, it would still be easier than like five hundred or something miles.

In contrast to the teachers' apparent investment in the structure of the discussion and their roles as chairs of the discussion, the primary student role was stakeholder. In this role they raised issues, took positions, stated reasons for their positions, and asked questions as part of their arguments in a dispute. Where the teachers were invested in the form of the discussion the students were invested in the outcome. The following example of a student reason in support of a position followed by a student reason that counters the same position illustrates this kind of investment.

Student 1: Uh, if we build it near Costa Rica or whatever it is, tropical rain forest by the ocean, if we built it right there, we'd have ocean animals, seashore animals, and rain forest animals. And rain forest animals would probably be the hardest to get anywhere else and so if you, I think it would be much easier.

Student 2: Um, you said like, I don't know about the ocean animals, but the seashore animals, I'm working on the seashore and we were like, we were researching on different, we were researching on animals that were more in the temperate climate, Mediterranean climate. And the tropical animals along the coast aren't the kind of animals that we've been researching. Like, I don't, we would have to ship in different animals for the seashore. I don't know about any other.

The first statement is a student's reasons for his position that the Biosphere be located near Costs Rica. One of his reasons is proximity to seashore animals that presumably would make access to and shipping of these animals easier. The second student is one of the students who had been researching seashore ecosystems and objects to this reason because they have been planning on simulating a temperate seashore ecosystem which would require different animals then those found in Costa Rica. It is clear from this exchange is that both interlocutors have a stake in the issue at hand and present well reasoned arguments for their positions based on knowledge they have accumulated through research.

Students' role as stakeholders is equally apparent in their use of questions. The following exchanges took place immediately following the above segment.

Student 1: Well, what do you consider the seashore? Is it...

Student 2: Well, it's like along the coast of the ocean, right.

Student 1: Deep in the ocean?

Student 2: No. Like the beach and 100 feet into the water or less.

The two student requests for an elaboration of a reason followed by the requested elaborations were coded as such, yet it is clear from the preceding co-text that Student 1 was not using structural prompting to chair the discussion but was involved in an argument with student 2, another stakeholder in this exchange.

Discussion

This fact that students made 65% of the statements about issues, positions, and reasons does not indicate anything about the balance of control as it is easy to imagine a totally triadic IBD where 100% of statements about issues, positions, and reasons are raised by students in response to thematic and structural teacher prompts. In this transcript, however, only 30% of the student-statements followed teacher requests. These results taken together suggest a fairly high degree of student control. In addition the analysis of the co-text surrounding student and teacher requests and statements indicates that while both students and teachers contributed to controlling the discussion, they did so from different roles with different investments.

A remaining question is, how did IBD in the context of a shared design-project contribute to students and teachers having these investments, taking on these roles, and sharing in the control of the activity? The two answers proposed here concern the relation between classroom knowledge and classroom control asymmetries and the distinction between control of the structure and thematic content of an activity.

I propose that the design context supported a balance between teacher and student control by reducing the knowledge asymmetry that typifies most classrooms. While the teachers clearly had more relevant domain-specific expertise than the students, they did not have answers to the design questions the students needed to answer in order to complete their design task. Thus, when teachers did ask questions, the students did not act as game show contestants trying to guess the answer the teacher had in mind. In addition, the long-term nature of the design project gave students the opportunity to build up a lot of relevant background knowledge that also contributed to reducing knowledge asymmetry.

In addition, IBD in the context of a design task supported teachers and students focusing on controlling different aspects of activity. In the activity analyzed here and many other forms of activity that took place in this classroom, teachers were focused on controlling the structure of activity. The teachers' focus on the structure of various activities both supported students control of the thematic topic by providing a structure for them to work within and left room for them to take control of this important part of the activity. The fact that the we considered ourselves experts in the structure of IBD and other classroom activities left us feeling more comfortable than we may have otherwise felt venturing into content areas where we were far from expert. In addition, the design task seemed to capture students' interest and contribute to their commitment to various outcomes. On the other hand, because our expectations were that students would learn about science as they constructed a novel design rather than that students would discover accepted scientific truths on their own, we were relatively free from commitment to specific outcomes of activity. Students commitment to outcomes in conjunction with teachers lack of commitment to outcomes provided additional support of student ownership and control of the activity's thematic content.

Clearly IBD in the context of a design task is not sufficient to ensure shared control of activity in a classroom. In our classroom student responsibility for assigning turns during all discussions and for other types of classroom business including when and how to carry out various activities seemed to play an important role in this achievement. Also, the teachers avoidance of typical teacher-register moves such as interrupting and evaluating students and the teachers' general respect for the students and their input seemed to play an important role in this classroom's balance of power.

In conclusion, this paper introduced, described, promoted, and provided examples of Issue-Based Discussion as an activity type and suggested how Issue-Based Discussion supported a balance between teacher and student control of activity during a whole-class discussion. An analysis of teacher and student moves was used to support the hypothesis that students contributions were often made independent of teacher requests. Further, a more in-depth look at teacher questions indicated that they served as structural rather than thematic prompts giving students greater freedom in their construction of answers than is possible with thematic questions typical in triadic exchanges. Finally an examination of the co-text surrounding teacher and student requests and statements was used to suggest that teachers played the role of activity chairs while students acted as stakeholders which supported a balance between different types of control.

Unexamined here are two important issues. First, did students learn how to engage in well reasoned argumentation and did students learn traditional scientific content as well? And second, what features of a design project make it suitable for use in classes of the type described here? I plan to explore the first question through the analysis of additional data already collected from the class described here including a content knowledge test given four times throughout the year, student notebooks, and transcripts from other discussions both preceding and following the discussion reported here. I hope to explore the second question through the study of additional cases of classrooms organized around shared design-projects.

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