EXTENDING INSTRUCTIONAL CONVERSATION

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For more than two thousand years, educators have argued the need for a form of instruction in which learners are treated as active agents who, along with their teachers, engage in a form of discourse that aims for the enhancement of understanding rather than the one-way transmission of information (Goldenberg, 1991). However, it was not until Roland Tharp and Ronald Gallimore (1988) coined the term “instructional conversation” and provided an explicit model of what an IC entails that the significance of this rather general recommendation became the focus of systematic practice and research.

As a concept, instructional conversation “contains a paradox: ‘Instruction’ and ‘conversation’ appear contrary, the one implying authority and planning, the other equality and responsiveness” (Tharp & Gallimore, 1988). However, as they themselves acknowledge, this paradox is more apparent than real for, in many contexts outside the classroom, it is through instructional conversations that parents and subsequent mentors enable learners of all ages “to go beyond themselves” by engaging with them in joint activities and assisting them through action and talk with those aspects of the activity that they cannot yet manage alone (Vygotsky, 1934/1987). This being so, Tharp and Gallimore (1988) argue, “the task of schooling can be seen as one of creating and supporting instructional conversations, among students, teachers, administrators, program developers, and researchers” (p. 111).

In this chapter, we hope to further develop the theoretical rationale for the effectiveness of instructional conversation and provide some additional examples of what it can look like in the practice of educators who are exploring ways of bringing the principles of IC to bear in a variety of educational contexts. Most of the published examples of IC involve discussion of literary texts in primary classes; the examples we shall discuss range more widely across subject matter and age, from social studies in grade three to a graduate class discussing cultural historical activity theory (CHAT) online. In these ways we hope to extend the appeal of instructional conversation to a wider range of educators.

Learning through Interaction

Like Tharp and Gallimore, we follow Vygotsky in recognizing semiotic mediation in the context of jointly undertaken cultural activities as the principle means whereby learners appropriate the knowledgeable skills that those activities require and, in the process, develop their identities as members of the communities in which those activities are practiced. Shared meaning is made in many modalities, of course – in action, gesture, dance, music, and the visual arts - and in various multimodal combinations. However, linguistic discourse, both spoken and written, has a privileged status, in that it is not only one among the many semiotic systems through which culture is created and maintained; it also “serves as an encoding system for many (though not all) others” (Michael A.K.
Halliday, 1978). Not only is it the principle medium for coordinating action, but it also provides the means for reflecting on action and for describing events and developing explanations of them; it thus allows humans to exercise some degree of control over the material and social world in which they live. It is for this reason that Halliday goes so far as to claim that discourse is “the process through which experience becomes knowledge” (Michael A.K Halliday, 1993). And clearly instructional conversation has a central role to play in this process.

To enable the transformation of experience into knowledge to be organized most effectively, however, we need to understand why conversational discourse has this powerful epistemic potential. Here, the work of Bakhtin (Bakhtin, 1986) serves to complement Vygotsky’s concept of semiotic mediation. Central to Bakhtin’s work is his emphasis on the dialogic nature of language use. Every utterance, he points out, is oriented both to the anticipated response of its recipient as well as to the utterances that preceded. As he wryly observes, the one who utters “is not after all the first speaker, the one who disturbs the eternal silence of the universe” (1986, p. 69). On the contrary, “any utterance is a link in a very complexly organized chain of other utterances” (p.69); it is filled with “dialogic overtones.” In conversation, therefore,

the unique speech experience of each individual is shaped and developed in continuous and constant interaction with others’ individual utterances. This experience can be characterized to some degree as the process of assimilation – more or less creative – of others’ words (and not the words of a language). Our speech, that is, all our utterances (including creative works) is filled with others’ words, varying degrees of otherness or varying degrees of ‘our-own-ness’, varying degrees of awareness and detachment. These words of others carry with them their own evaluative tone, which we assimilate, rework and accentuate (1986, p. 89).

Bakhtin was most interested in the dialogicality of literary utterances – complete novels or poems – but the above statement clearly applies equally to the child’s first learning of his or her mother tongue, to the learning of a second language, and also to the learning of the registers of written language. Whatever the modality or genre of language use, we master it by appropriating the words and phrases - as well as the ways in which these resources are used in different situations and for different purposes - from the utterances of particular others, as we engage in dialogue with them.

However, it is not only the culture’s way of using language that is learned through dialogue. Every utterance not only offers a ‘model’ of language use, but it also provides evidence of the way in which, within a particular culture, experience is named, categorized and interpreted by the ‘meaning potential’ of the language system. As Halliday (1978) emphasizes, in learning to talk, a child also learns through talk and thus assimilates the ‘world view’ of the community in which he or she is growing up. Without his or her conscious awareness of the process, the child’s participation in joint activities and in the linguistic interaction that accompanies, directs and comments on them transforms his or her raw experience into a personal construction of cultural knowledge. In other words, Bakhtin’s concept of dialogicality applies equally to knowledge construction - as can be seen by substituting ‘knowledge’ for ‘speech experience’ in the immediately preceding quotation from his work.
But what this substitution also highlights is the fact that words, utterances and the knowledge they encode are constructed and contributed by particular individuals on the basis of their unique trajectory of experience of participation in a particular range of activities within particular communities. Even when, through participation in the activities of schooling and, in some cases, of higher education, they have read the same texts and listened to similar teacher expositions of the same curriculum, they still each contribute their “own-ness” to their understanding of the topics studied and to the knowledge they are constructing.

It might seem, therefore, that each of us is confined to his or her own private world, condemned to misunderstand – or at least to differently understand – others’ words and meanings and for the most part to be completely unaware of the subjective nature of our own idiosyncratic world model. Fortunately, however, this is not entirely the case. For most occasions of interaction also provide opportunities for the calibration of knowledge, as it is brought to bear on the issues and problems that inevitably arise in the prosecution of any joint activity. The result is that people who regularly engage together in joint activities eventually develop a degree of shared knowledge and overlapping meanings sufficient for their practical purposes. Indeed, this is one of the strongest forms of evidence for Vygotsky’s insistence on the centrality of joint activity on all the timescales of development, from microgenetic to phylogenetic. Franklin ((Franklin, 1996) captured this insight very succinctly when she proposed that knowledge is constructed and reconstructed in the discourse among people doing things together.

Not all discourse is aimed at knowledge construction, however. As Eggins and Slade’s (Eggins & Slade, 1997) work on the analysis of casual conversation makes clear, a substantial proportion of conversation among family members, friends and colleagues is more concerned with establishing and maintaining social roles and relationships and with the consolidation of shared evaluative stances than it is with the calibration and construction of knowledge. If the latter is involved, it tends to occur implicitly and as an instrumental means toward the achievement of the social goals of the conversation. And for this reason, as teachers, we need first to focus on creating positive social and affective relationships among the members of our learning communities (Mahn & John-Steiner, 2002).

Nevertheless, there are occasions of conversation where collaborative knowledge building is explicitly one of the goals of the interaction and, in these conditions, participants’ recognition of the occurrence of misunderstanding or disagreement can instigate a deliberate exploration of the nature and extent of the disagreement and an attempt to arrive at a common understanding. Bereiter (1994) terms this kind of interaction “progressive discourse,” which he sees as the antidote to the relativism inherent in the idiosyncratic status of the knowledge constructed by individuals, as described above. In collaboratively undertaken progressive discourse, he argues, the aim is to achieve “a new understanding that everyone involved agrees is superior to their own previous understanding” (Bereiter, 1994). This, it might be argued, is also the desired outcome of the teacher’s intentional use of instructional conversation.

However, this still leaves unanswered the question as to how precisely participation in progressive discourse can lead to an enhancement of both individual and group understanding. In the next section, we shall attempt to sketch an answer to this question by further considering Bakhtin’s concept of dialogicality and, more specifically,
by exploring the implications of his argument that each utterance “is a link in a very
complexly organized chain of other utterances” (1986, p.69).

**Constructing Knowledge With and For Others**

One of the characteristics of any form of construction, material or symbolic, is that it can be considered from two perspectives: the processes involved in its creation and the product that results. This is as true of utterances and works of art as it is of buildings and machines. With respect to utterances, these two perspectives can be described as “saying” and “what is said.” Each contributes in its different way to the development of understanding.

In uttering, the speakers’ efforts are directed to the saying - to producing meaning for others. To do this, speakers have to interpret the preceding contribution(s) in terms of the information it introduces, as well as their own stance to that information; compare that interpretation with their own current understanding of the issue under discussion, based on their experience and any other relevant information of which they are aware; and then formulate a contribution that will, in some relevant way, add to the common understanding achieved in the discourse so far, by extending, questioning or qualifying what someone else has said. It is frequently in this effort to make their understanding meaningful for others that speakers have the feeling of reaching a fuller and clearer understanding for themselves. (Wells, 2000)

The process of speaking also produces “what is said”, a perceptible signal that is generally available to all participants, and responding to it involves a comparable process, whether by others or by speakers themselves. For, as Bakhtin (1986) pointed out, to respond to an utterance is to interrogate the meaning of what is said, to evaluate its coherence and relevance, and to begin to formulate a further response.

In contributing to progressive discourse, then, a speaker is simultaneously adding to the structure of meaning created jointly with others and advancing his or her own understanding through the constructive and creative effort involved in saying and in responding reflectively to what was said. And, since a similar constructive effort is required to listen responsively and critically to the contributions of others, that too provides an opportunity to advance his or her understanding. It needs to be emphasized, though, that it is the joint attempt to construct common understandings that the participants recognize as superior to their previous understandings, as Bereiter put it above, that makes progressive discourse such an effective means for participants to enhance their individual understandings. For dialogue of this kind involves both the internalization of the meanings created in the inter-mental forum of discussion and the externalization of those intra-mental meanings that are constructed in response; it also constitutes a particularly clear instance of Vygotsky's insight that "the individual develops into what he/she is through what he/she produces for others" (Vygotsky, 1981).

To a very considerable degree, this account of the discourse of collaborative knowledge building applies also to instructional conversation. Certainly, the aim of such conversation is for the student participants to extend their understanding of the topic of conversation by relating the new information to their own and others’ previous experiences, thereby making meaning with the new information. In addition, such
conversations also extend the students’ command of the language in which the discussion is encoded and of the relationship between topic and situation and the linguistic registers appropriate to them (Halliday & Hasan, 1985).

The main difference between the two genres of discourse is in the role played by the teacher in instructional conversation. Whereas the kind of progressive discourse that Bereiter describes does not assume that one of the participants is more expert than the others with respect to the topic under discussion, nor that one participant has the right or obligation to direct the course it takes, this is less the case with instructional conversation. As Tharp and Gallimore (1988) make clear, while the ostensible purpose of IC as practiced in elementary classrooms is to read the text and talk together about it, and while, on the surface, the flow of talk is conversational, there is in fact an underlying structure.

The structure is provided by an explicit set of instructional objectives, devised by the teacher from the specific subject matter of the lesson, and the ever-present meta-objective, to increase comprehension and competence in discourse in the domain of instruction” (p. 136).

Does this crucial difference between the two types of discourse with respect to their participant structures outweigh their similarities with respect to their goals? We think not. While the instructional emphasis in instructional conversation is very much to the fore in the examples that Tharp and Gallimore (1988) quoted from ICs in the primary grades, it has the potential to transform into an emphasis on inquiry, in which the topics to be investigated and the means to be used are negotiated by teacher and students in collaboration. It is to an exploration of ways in which this transformation might be achieved that we now turn. We begin with a consideration of the “improvable object” as a focus for knowledge building.

The Value of an Improvable Object
Over the course of human history, the most frequent spur to collaborative knowledge building has undoubtedly been the emergence of a problem in the course of a group’s engagement in a routine activity or the challenge of taking on a new goal for which no procedures or tools had already been invented. Such situations demand initiative and creativity; they also bring about a transformation or extension of existing knowledge and skills. A rather similar description also applies at the ontogenetic level in the learning of cultural practices by novice members of a community. In the latter case, however, more expert members can provide assistance in solving what the novice experiences as a problem and typically they do so in a manner that enables the newcomers to achieve mastery of the relevant knowledgeable skills so that they are eventually able to participate in the activity autonomously. Such assistance of performance was described by Vygotsky (Vygotsky, 1978) as “working in the learner’s zone of proximal development.”

In both cases, a key role is played by the object of the activity, where this is understood both as the end in view and as the product under construction. The attempt to find a way of moving toward the goal or of creating and making improvements to the product provides a joint focus for effort and attention and stretches all concerned to “go beyond themselves” in both skill and understanding. The same is equally true when
dealing with intellectual problems as diverse as, for example, designing the layout of a new town or developing an explanatory theory of some phenomenon. An actual three-dimensional model of the terrain or a representation of the theory in the form of a text, a flow diagram or some multimodal combination, allows the collaborating participants to illustrate their arguments, test the consequences of their proposals and, in these ways, make improvements to the object on which they are working.

In the classroom, such improvable objects can take a variety of forms, as the teachers in the Developing Inquiring Communities in Education Project (DICEP) found, as they explored ways of approaching different curricular topics with an inquiry orientation. These ranged from a working model of a land yacht created by two girls in a grade four unit on technology (Wells, 2002) to the role-played enactment of the hearing of a First Nation’s land claim before the Supreme Court of Canada, which was the culmination of a grade seven’s study of political history (Kowal, 2001). In these and other cases, which the teachers made the subjects of their own investigations (Wells, 2001), instructional conversations occurred at various points along the way: as the whole class or small groups brainstormed the form(s) their object-in-view might take; in the course of collecting or interpreting evidence; following group presentations of work in progress to the rest of the class; and, most importantly, in the whole class discussion that typically formed the conclusion of the unit as a whole.

Rather than draw from these already published studies, however, we prefer here to present two small ongoing projects from schools in Santa Cruz County in California, where Roland Tharp’s ideas have significantly influenced the ways in which a substantial number of teachers are attempting to make connections between the home and community experiences of the student members of their diverse classrooms and the increasingly strictly mandated curriculum that they are required to teach. In both of the following studies, the teachers concerned are committed to creating opportunities for students to bring their experiences and ideas to the topics being investigated, while at the same time ensuring that the ensuing conversations contribute to their curricular objects-in-view.

The first project involves an ongoing collaboration between the first author and the teacher of a grade four class in a culturally diverse urban community. While most of the students are from homes in which English is the first language, the class contains several who only started to learn English on entry to school. It was the teacher’s concerns about the effectiveness of his program in meeting the needs of these students that, through the mediation of the student teacher assigned to his classroom, led to our collaboration.

**Designing, Building and Testing Model Cars**

My first visit to Buzz Gray’s classroom occurred in December, on the last day before the holiday break. I had been invited to an annual end-of-term event: the “lunch-box derby.” For this event, (which was related to the health and nutrition curriculum) the children had brought to school “vehicles” constructed from fruit and vegetables, with the aim of making them to go as far as possible when released down a ramp. As the children took turns in running their vehicles, we all noticed that some traveled a considerable distance while others fell apart as they reached the point where the ramp rested on the level floor of the classroom. The winning vehicle, which traveled 13 feet and 6 inches, was simply
constructed from a banana and four oranges, with wooden skewers providing the axles. When all the runs had been measured and recorded, the teacher brought the class together to consider the results, which he represented on the whiteboard in the form of a simple frequency distribution of distances achieved. However, with the holiday just beginning, there was no time to further explore the significance of these results.

Early in January I contacted Buzz again with the suggestion that it might be worthwhile to capitalize on the interest generated by the lunch-box derby and to try to engage the children in a sustained investigation of the design of similar vehicles made from more durable materials. Buzz agreed and together we planned how to proceed. As with the lunch-box derby, the first aim we proposed to the children was to design and construct vehicles that would travel as far as possible from the end of the ramp. At the same time, however, we had a second aim in view, which was to encourage the children to identify and explain the design features that led to success.

Much was learned over the next three months, with the last hour of each week devoted to designing, constructing and testing vehicles from scrap lumber, wooden and plastic disks of various kinds to serve as wheels, and wooden skewers or carriage bolts as axles. The children made considerable progress in working together in collaborative groups; they also learned quite a lot about using the various materials effectively. However, because there was such a variety of designs and such varying degrees of constructional success, it was not possible, in the time, to carry out controlled tests of potentially critical variables. From this, the adults learned that it would have been preferable to use more standardized materials and to take a stronger lead in directing attention to specific design features in order to highlight those that might be critical for success. This was what we decided to do in a second iteration with a new group of students at the beginning of the following school year.

This time, the lessons were scheduled for a 90 minute period earlier on Fridays and, as planned, we provided more standardized material, including commercially available construction kits. We also led them to understand the concept of controlling all but the experimental variable and taught them to average several runs to overcome inaccuracies of measurement. Over ten weeks, based on student suggestions, the effects of changing a number of variables were investigated: length of chassis, diameter of wheels, weight of vehicle and the ramp's angle of incline. At the end of each lesson, some time was spent in reflecting on what had been learned from the morning’s experiments. As can be imagined, this led to some very interesting class discussions, in which students came up with a variety of hypotheses using such explanatory terms as 'momentum', 'traction' and 'friction'. Following these discussions, the students were also asked to make entries in their journals about what changes they had made to their vehicles and what they had discovered as a result.

By the final lesson we had firmly established that the length of the chassis and the wheel diameter did not make a difference; on the other hand, we found that adding weight reduced the distance traveled across the carpet in the classroom whereas, when we took the cars out into the playground and tested them on its asphalt surface, adding weight made some cars go further than without the extra weight. On a different occasion we also found that increasing the angle of the ramp significantly lengthened the distance traveled. This prompted a lively discussion about the relationship between the force that gives the cars their momentum and the competing force that makes them slow down.
Finally, we found that putting a drop of oil between each wheel and the axle enabled all the cars to travel further.

The following extract is taken from the final review, the aim of which was to reconsider all the variables that might make a difference as a prelude to inviting individual inventiveness in making a vehicle at home that would go as far as possible, with the trials to be held in the final session. Buzz led off the discussion by inviting students to suggest any features of their vehicles that should be treated as of particular importance; GW, the first author, joined in later. After several contributions, Jesse indicated that he wished to speak.

1 T: Jessie, what do you think?
2 Jes: Well, er- this is my theory of why weight helps when you're on the asphalt-
3 T: What do you mean, theory?
4 Jes: My theory- like- well it's not really x x x but it's like weight- why weight causes x the asphalt. 'cos the asphalt has little bumps which x x the little bumps make the cars go UP a little bit and that slows them down. but with weight. um it keeps the car um. going to- going THROUGH the x x
5 T: That's a good theory . Hannah (nominating)
6 Han: Er- I- um- I've been thinking about it's um-because um-. because I said if you took er- a bunch of <knobbly> tires and <went> on a bumpy road. if it would go faster or. um- like. so skateboards, they have smoother wheels. and if um you want to go FAST. then there's this ramp to do it on (makes gesture of going down a slope) and a real smooth- . people normally skate on. flat smooth ground (makes horizontal gesture). [T: Uh-huh] if they want to go fast so I think-. and so I think it might have to be- if it's smoother- if they're going smoother it will go further than if xxx (voice drops away).
7 T: OK ... Well Jesse's brought up the word. "theory". which is kind of like you're taking a guess on something which you do have some facts but it has never been PROVED. like he was saying "well we didn't PROVE that. but based on all the stuff that I was observing out there this is kind of my theory"..

In this and the following extracts, the following conventions are used: < > surrounds passages for which the transcription is uncertain; x indicates a word that was unintelligible; CAPS indicate emphasis; ___ underlining indicates segments of speech that overlap; - indicates an interruption, either by another speaker or by the current speaker making a new start; . indicates approximately one second of pause; ( ) enclose glosses on meaning or nonverbal communication; [ ] enclose descriptions of action or contextual information.
Does anybody have a theory - this is like - out there - like the future thing - on how - you could make a car that would go - farther than that wall? (pointing to end of room opposite him) ... without an engine, just using the ramp? .... How you could improve on them, I mean ... Miguel (nominating)

8 Mig: Make the ramp - a little bit higher-
9 T: Ok, so make it more- we found- we found out that we can make cars .. go farther if the ramp's . on a bigger angle
10 Mig: -cos it's going to crash to the floor when- it's going to stop like this .
   so we
11 GW: Could I ask a question? Do you remember we've been talking about a sort of struggle between two . forces . one of them is friction, what was the other one that we were-
12 Many:Gravity
13 GW: Gravity, OK . so . why do you think they go further if we make the slope of the ramp steeper . what do we change when we change the slope?
14 T: Miguel again (nominating him from among those with hands up)
15 Mig: If you put it a little bit higher it's going to crash down on to the floor . but if you put like soft paper that goes like that (one hand moves up and down on the other indicating a cushioning effect) it might go along a bit like in a roller-coaster they go UP and they go DOWN but they don't crash through x x-
16 GW: Yes, but- . why- why would making the slope of the ramp steeper .. make it go further? what's that changed in the struggle between the two forces?
17 T: Hasmin (nominating)
18 Has: Because it makes it go faster
19 GW: But why? ... what's changed?
20 Has: Because of the angle that the ramp is at-
21 T: It's going to go faster, we'll give you that but why is it going to go faster . what- what's making it go faster?
22 Several: Gravity
23 GW: Ok, so what's changed about gravity?
24 T: Oh, Jesse (nominating)
25 Jes: Well um . I think um- when gravity's <in > it has more force going down . so with more force it has more speed . that way it can go farther on the carpet
26 GW: So if we were to have the ramp ... like that (holding ramp vertically)
27 Many: Oh (excitedly)
28 Jes: It would break
29 GW: It would go BOOM (demonstrating) . really fast because there's lots of gravity . but it wouldn't run along the floor because it would just go bump . so if we-
30 S1: There's not enough friction (as the car travels down the ramp)
31 S2: It would fall
32 GW: That's right . well it wouldn't be just not enough friction . but it couldn't make the turn as it got to the floor (demonstrating turn from vertical to horizontal movement) if we had it absolutely upright
33 T: Yes .. Miguel (nominating)
34 Mig: This was falling <but> say you started off high <this was gravity>. so . it
could- it would be <really> softer <first> if you put a piece of paper right there (pointing to the bottom of the ramp) and taped it and it goes like that (showing a curved trajectory when reaching the paper) . like that (demonstrating on his open journal) . and then it could run away . it’s going far . it would go far (gestures the trajectory of the roller-coaster)

There are several things to note about this discussion. First, and perhaps most important, is that it had a goal: to identify the design features that should be attended to when the children set about building their individual vehicles at home. Second, and related, was the fact that their suggestions arose from their experiences over the previous weeks in trying to determine which were the features that were important. But equally significant was the shift that had taken place in their thinking about those experiences. Rather than simply reporting how their group’s vehicle had performed, they were beginning to offer explanations for what they had observed. Jesse’s contribution was particularly significant in this respect. First, he offered an explanation as to why adding weight to the vehicles enabled them to go further on the asphalt when the opposite result had obtained in the carpeted classroom. And second, he characterized what he had to say as “my theory” – a technical term that had not previously been used by any one else. Buzz was quick to seize on this word, providing a gloss that might prompt others to present their ideas in similar terms.

A second interesting feature was the obvious enthusiasm for increasing the slope of the ramp as a way of making the vehicles go further. The session in which we investigated this variable caused great satisfaction, as every group’s vehicle traveled considerably further when the slope was increased. In fact, in this condition, some of the more successful vehicles could not run their full course as they hit the wall at the far end of the room. In this final discussion, Miguel, the boy who first suggested this strategy, was also the one to suggest a way of overcoming the problem of the vehicles breaking apart when they were launched down a near vertical ramp. Drawing on his experience of riding the roller-coaster – a popular attraction at the Santa Cruz Boardwalk – he suggested attaching a sheet of stiff paper part way down the ramp to convert the sharp angle between the ramp and the floor into a gentler curve which the vehicles could safely traverse. Then, a few turns later, after Jesse had made the connection between gravity and the increased speed down the ramp, Miguel once again explained through words and gestures how the card attached to the ramp would allow the vehicles to maintain their increased speed and, as a result, to travel further across the floor. It is interesting to note, therefore, that Miguel was one of the small number of English language learners (ELLs) in the class, about whose progress Buzz had been concerned and that had led to the first author’s initial visit to his classroom. Clearly, as far as Miguel was concerned, the invitation to speak from his own experience enabled him to make a really important contribution to the discussion, linking the children’s shared interest in the practical investigation with the scientific concepts of gravity, momentum and friction that the adults had intended they should begin to understand.

Learning Language and Learning Through Language
The preceding example was taken from a class in an urban classroom in the Central Coast area of California. While a substantial proportion of the children were growing up
speaking both Spanish and English, most had already achieved a reasonable mastery of English. In the next example, taken from a grade three class in a rural school not very far away from the first, all the children were from families of Spanish-speaking agricultural workers and were designated English Language Learners (ELL). The program in which they were enrolled was described as ‘transitional bilingual’ and Spanish was used as a medium of instruction for all content area instruction, English only being used in lessons designated as English language development (ELD).

At the time of the study carried out by the second author, Ms. Wilson, an experienced teacher, had been involved for eight years in a professional development project that promotes English language development (ELD) through science inquiry. In accordance with her belief that language is best learned through first-hand engagement with subject matter, she devoted her ELD blocks to science inquiry. She created many opportunities for her students to engage in hands-on experiments to build a basis for developing academic registers, scientific reasoning skills, and thinking skills. In spite of their limited English proficiency (beginner to intermediate), her students were observed to participate in science inquiry competently by carrying out experiments, predicting, observing, keeping records of their observations, and interpreting results.

An inquiry approach, of course, may take different forms, ranging from a teacher-directed investigation to a more full-fledged one that is based on mutual negotiation between teacher and students with respect to the topic and the means for its investigation, depending on students’ level of English language proficiency, their cognitive maturity, and the nature of the subject matter in focus. This example falls toward the former end.

The focus of the case study was to investigate the way in which Ms. Wilson attempted to adopt an inquiry approach to social studies in a unit on “community and change” with a secondary focus on science. This was a major undertaking for her. First, she needed to imagine what a hands-on inquiry might look like in social studies, which required a paradigm shift from her normal use of prescribed textbooks. Second, she needed to develop all the instructional materials by herself, which in the case of science inquiry were provided by the PD project. Ms. Wilson spent half a year developing her thematic unit on “community and change” through collaboration with two colleagues at her school. We first provide a brief overview of the unit and then discuss instances of instructional conversation that can be considered also as cases of “exploratory talk” (Barnes, 1976), talk in which students explore ideas with teacher guidance.

The focal unit was designed using the California Social Studies Standard (3.1) under the heading of continuity and change: Students describe the area’s physical and human geography and use maps, tables, graphs, photographs, and charts to organize information about people, places, and environments in a spatial context. Ms. Wilson wanted her students to develop map-reading skills and to understand the concepts of community and change particularly in relation to the local area. The challenge that she faced was to make these abstract concepts accessible to her young second-language students. She started with a brief teacher exposition of what a community typically consists of and quickly moved to ask her students concrete questions: where they lived, other communities they had visited, naming the geographical features, and the industry in the local community. In lieu of a hands-on experiment in science, she drew on her students’ knowledge base and constructed shared discursive space about their local
community. Having established this common ground and roused her students’ interest, she introduced a map reading activity in the third lesson. The first excerpt of instructional conversation is taken from this introductory phase. In groups of four, the students were carrying out a vocabulary review game. Ms. Wilson visited each group in turn to explain how to read a topographic map of the local region:

Excerpt 1
1 T: I'm gonna come to your table, I think, it might be easier [while speaking she walks around with a big laminated map] So let's- you're gonna have to close your journals so that I can put this BIG map on your table
2 S1: Whoopee
3 T: (lays a map down at a table) This is called a topographic map and what it shows-
4 S2: xx
5 T: Right
6 S3: Teacher we have to write in English or Spanish?
7 T: English
8 S3: xx
9 T: Well that's fine however- however xx
10 S3: Teacher <apopotes apopotes> (meaning unclear)
11 T: OK, see these little lines that look like a lot of squiggly lines
12 SS: Yes
13 T: OK, what these lines are showing.. is the hi- how high things are . so you notice there's-
14 S3: Teacher xx
15 T: Excuse me . just let me finish explaining- there's some lines here but they aren't very close together as they get closer together that means it's . it's higher . so all of this (pointing to an area on the map) as you can see has a lot of really really close together lines which means these are the mountains . THESE are the mountains that we saw when we were- when we were walking . see here's [our] School right there (pointing to map) . here's the street where we crossed and we looked- and we looked to our left we looked straight out here . this is what we saw .. these are mountains-
16 S4: Cool
17 T: - right there
18 S2: That looks like a car with a little flag (pointing at the map)
19 T: Ok, where's the river . where's the Pajaro River? [students are scanning the map with their fingers looking for the river]
20 S4: It's supposed to be <white> x
21 S1: PAJARO (pointing to the river on the map)
22 T: No (not clear who she was responding to)
23 S2: Here's xx
24 T: It's right here . here's the Pajaro River going all the way back . you can see it- it's coming ALL the way-
25 S4: From here
26 T: - from- from over here . so it goes all the way along here (tracing the river
with her finger on the map) .. very long and it goes out to-

27  S3: Teacher what are these?
28  T: - if you go on it would go out to the ocean
29  S3: Teacher I one question, are these- Que es esto? [What is this?]  
30  T: This is Riverside Road so that's Riverside-
31  S4: Oh oh this is Watsonville
32  T: - see there's the high school . yes, all of this is Watsonville . all of this all  
the way out to here now is Watsonville
33  S1: I like this (pointing to an area on the map)
34  S2: Here's high school
35  T: Here's the high school um there's the Plaza
36  S1: Plaza
37  S3: The Plaza _____
38  S4: HEY then I must live right here
39  S2: Where's my house?
40  S1: Mine's en by x Park Hospital
41  T: The hospital, except that's not really the hospital anymore
42  S3: I know, Teacher
43  T: The hospital is out by the airport now
44  S2: More over here
45  T: This map is- when this map was made that was the hospital but now  
the hospital is- . let's see Airport Boulevard [teacher and students are looking  
for the hospital] . yes, see here's Freedom Green Valley Road is right-
46  S3: Teacher, am I- if- if I am in Pinto Lake where would I live
47  T: Pinto Lake is up here . so look look at all this . see this part with all  
these lines and over here there's more lines and all around these-
48  S2: Those are all the Santa Cruz Mountains
49  T: Not all of them . these are not the mountains . these are like hills
50  S3: Hills]
51  T: And see this part is FLAT because it doesn't have a lot of wavy lines . and  
then this whole area is also very flat because it also doesn't have lot of  
wavy lines

As shown in the transcript above, an abstract map reading became a hands-on  
tactile activity when the students moved around the table and attempted to locate places  
on the map by physically feeling their way around the map. They intently examined the  
density of squiggly lines, gradually learned to locate local landmarks, and inferred the  
location of their houses on the map. Turn 19 marks a shift in the teacher’s gradual hand- 
over to student exploration when she asks where the Pajaro River is. After a few failed  
attempts from the students, in turn 24 she shows where the river is on the map by tracing  
it from the mountain to the ocean. This tracing action prompted some of the students to  
start to engage in the same action and at the same time to make the connection between a  
long narrow winding line cutting across the map and the Pajaro River. For Marco, it is  
not until turn 31 that he understands this correspondence. Ms. Wilson then goes on to  
identify places familiar to the students: the only high school in the area and the Plaza in  
the city center.

Turn 38 marks a transition to a more fully blown exploration of ideas when one of
the students exclaims with enthusiasm: “HEY then I must live right here”. For the next ten turns or so, one after another, the students try to find the location of their houses on the map. By this stage, it was they who were initiating the talk. One of the students says, “Teacher, am I- if I am in Pinto Lake where would I live” (If I live close to Pinto Lake, where is my house on the map?). Despite grammatical inaccuracy, it is clear that the student is attempting to speculate. While this is quite a small step towards “exploratory talk,” it is clear that the students in this group had started to grasp that the map represented the local area and that they were co-constructing their understanding with the assistance of Ms. Wilson.

After the map reading, more hands-on activities followed to reinforce the students’ understanding of different representations of the local area. First, they colored their topographic maps of Watsonville according to landforms; then, based on their colored maps, they also constructed three-dimensional relief maps with play dough. In addition to this geographical component, Ms. Wilson attempted to introduce the notion of change, i.e., change in the local community, through picture comparison activities (photos of the community sixty years ago and now).

In addressing the notion of change from a different perspective, Ms. Wilson incorporated science. For this, she introduced two experiments that examined the effects of water and light on plant growth. The following excerpts, taken from the first experiment on the effect of light on plant growth under the with-or-without water condition, show that while the teacher selected the topic and experiments, she made sure to engage her students in “exploratory talk”:

Excerpt 2
1 T: What do roots do for a plant?
2 Ss: Water
3 S2: They absorb the water.
4 S3: They drink water.
5 S4: And they- they help the plant to grow
6 S5: They do something to xxx
7 T: They help the plant get the water.

This short sequence is illustrative of Ms. Wilson’s simultaneous focus on science content and language form. In turn 1, she poses an open-ended question, to which several students respond one after another, building on each other’s responses until they come to an approximation of the right answer in turn 5. This type of co-construction of meaning was typical in this classroom; over successive turns, student responses achieved an increased sophistication in terms of syntactic complexity and accuracy of content. The response by the first student consists of only one content word, water. The second and third respondents develop this into a complete sentence with a propositional content: Roots absorb water. Building on the previous responses, the fourth student provides additional propositional content: They (roots) help plants to grow. To conclude this sequence, in turn 7, the teacher reformulates the answer by combining the two propositions that the students offered. This type of reformulation was one of the most typical discourse moves used by this teacher. Admittedly, this is not as sophisticated as Bereiter’s (1994) “progressive discourse” nor is this excerpt built upon rigorous
intellectual debate in an attempt to resolve disagreement. However, what is clear is that the students were constructing their understanding together both in content and language form.

In the next excerpt, having established the function of roots for plant growth, the teacher prompted the students to pose a question and predict the results of the experiment.

**Excerpt 3**

11 T: It says QUESTION (pointing to the workbook that she handed out to the students), what we want to know. now, we are going to leave one- box with no water- we're going to have- put water in the other box. what do you think we want to KNOW- if we do that experiment? think about it

12 S1: See if they grow.
13 T: We want to know if- ?
14 S2: They grow
15 Fel: They grow without water
16 T: Say it again Felipe
17 Fel: They grow without WATER ..
18 T: If- these plants will grow without water .. does that sound like a good question?
19 Ss: No
20 Ss: Yes
21 T: Yes? .. raise your thumb up if you think that's a good question (demonstrates)
22 Ss: [Variously show thumbs up/down]
23 T: Okay, we want to see if these plants will grow without water
24 S1: No
25 S2: They won't grow
26 T: So write that on the LINE

As she typically does, the teacher starts the discussion with a negotiatory question: “What do you think we want to know if we do that experiment”. Building on the previous student’s responses, Felipe offers a correct answer in turn 15. It appears that, in order to ensure that all students understand the question, she not only asks Felipe to repeat what he said in turn 15 but also reformulates his answer in turn 18, thus creating redundancy in language use. In turns 18 and 23, she makes an interesting move, asking the students to evaluate Felipe’s proposition through doing thumbs up or down. This strategy was effectively used to help her students have ownership of the knowledge building process in spite of the constraints of their command of English. Also interesting is the fact that, in turns 24 and 25, two students immediately move to their prediction without needing a teacher prompt. Such voluntary predictions are considered to be an important step toward “progressive discourse,” albeit a small one.

In sum, there were instances of instructional conversation in the two content areas, although they occurred in different group configurations. In geography, considering the unit as a whole, there was much teacher exposition used to explain new concepts, vocabulary items, and skills, as well as procedural talk used to give directions
As to how to complete the activity at hand (e.g., map coloring, relief-map making). As presented in the first excerpt, instructional conversation occurred in a small group with the teacher in a map reading activity, where she helped students to make a connection between the physical features and landmarks of the local area and their representation on the map. This excerpt illustrated the way in which the students took turns spontaneously to locate their houses on the map; they were applying their newly acquired skills without being prompted. In science, on the other hand, it was in a whole class discussion during the predicting phase of the experiments that instructional conversation occurred. The question is why there were these differences between the occurrence of ICs in the two content areas. It can be speculated that while predicting results of science experiments was a well-established routine in Ms. Wilson’s classroom, reading a map is not only an abstract activity but also it was the first time it had been attempted in this class. This, in turn, may have necessitated the need for scaffolding in a more intimate setting than the whole class can afford. In other words, with young second-language students, both the degree of abstraction of a particular task and the familiarity with analytical procedures may affect where instructional conversation occurs. However, perhaps more significant are the similarities across the excerpts. That is, instructional conversation is more likely to occur when students are engaged in an activity, and are free to offer their opinions and explore their ideas in co-constructing common knowledge.

In both the case studies just presented, the instructional conversations occurred in the context of practical investigations where the object to be improved was the outcome of hands-on activity. In the next section, we briefly consider two rather different cases, in which student collaboration on the construction of a symbolic object extends the notion of instructional conversation still further.

**Improving Symbolic Objects**

The concept of an “improvable object” was first proposed by Scardamalia, who saw it as a central component of all the various realizations of the “knowledge-building community” that she, Bereiter and their colleagues have been developing for schools, universities, hospitals and businesses over the last two decades (Bereiter & Scardamalia, 1996; M. Scardamalia, 2000). In its first manifestation as the Computer Supported Intentional Learning Environment (CSILE) ((Marlene Scardamalia, Bereiter, & Lamon, 1994), the knowledge-building community was realized in a variety of classes, from grade one through high school, in each case by means of a substantial number of networked computers linked to a central database. Instead of all students learning from the same textbook, they were encouraged, either individually or in small groups, to take on one aspect of a curricular topic and, on the basis of research of various kinds, to contribute their theories and questions to the central database, where their stored messages could be responded to by answers, comments, and further questions, or by competing theories, contributed by other members of the classroom community. In this way, the whole class could participate in collaborative knowledge building as they attempted to improve on the initial contributions.

Later realizations of this design principle, which use the connectivity of the Internet, enable distributed communities of older students or of professional workers to be created. Here too, a similar pattern of progressive knowledge building can be seen as participants treat each other’s contributed observations and theories as objects that can
potentially be critiqued and improved. Based on the success of these projects, Scardamalia urges teachers to ensure that all students become engaged in authentic knowledge work:

Don't relegate some students to an idea-free curriculum on grounds that they are too young or differently-abled or that they have a different kind of learning style. Instead, capitalize on diversity (2000, p. 3).

Not all classrooms are equipped with the networked computers that underpin the Computer Supported Intentional Learning Environments (CSILE) that Scardamalia writes about. However, the principles can be reproduced in a variety of formats, as the following example shows.

Studying the Black Death
Having read about CSILE, Karen Hume decided to introduce the practice of collaborative knowledge building into her grade 6 and 7 class. However, not having enough computers to reproduce the same format, she decided to use a large bulletin board instead. When questions arose in the course of their investigations, students posted them on the “Knowledge Wall” and, as in CSILE, other students continued the dialogue by posting comments or questions below the opening question. In this particular unit, her students were studying the Causes and Consequences of the Black Death in Medieval Europe and, in the materials they were reading, some students were intrigued by references to and illustrations of protective clothing worn by doctors. As these written notes show, the students used conjecture, evidence from published material and reasoning to attempt to construct a satisfying answer to their question.

**Question:** Why did an odd bird figure in a cloak protect doctors?
(referring to an image from a history book showing a doctor clad in leather and wearing a beak mask that makes him look like a bird)

Ian: I don't have a total answer for this, but the paragraph underneath the picture says that the bird mask is to filter out the polluted air, and the wand is to heal patients. Don't ask me why he/she wears a leather cloak.

Eren: If what this guy is wearing is a mask, it might have actually helped him stay healthy.

Alec: This is good Ian, but why a bird/man/penguin?

Justin: At the end of the caption of the bird figure, in quotes, it claims, "doctors hoped to avoid the contagion by looking more like a crow than a man".

Can anybody try to clarify the quote?

Alec: Why a crow?

Suzanne: People probably wanted to be birds because they saw that the birds weren't dying. This is because birds don't get fleas and fleas caused the Black Death.

Matt: It was not the bird figure protecting the doctors like a god, but it is a form of disease proof clothing. The beak is an early form of gas mask,
the cloak of heavy leather. The wand is for soothing the patients. The doctor is covered from head to toe, therefore keeping out the disease.

Ray: Theoretically, the birdlike cloak thing might prevent the fleas from getting to the doctors skin, thus giving the individual the plague. The cloak was basically a shield.
Suzanne: This could and probably is true, but I doubt the people of the time knew that.
Jon: I think it is a witch doctor because of what he is wearing.
Justin: It is just a doctor dressed in leather wearing an early edition of a gas mask. More like a doctor wearing a shield from the fleas.
Suzanne: But Justin, the doctor didn't KNOW that fleas cause the disease, therefore he couldn't have been wearing it for protection. That's why I agree with Jon that yes, the doctor probably is a witch doctor. The bird suit only had a spiritual meaning.
Justin: I didn't say that he/she knew. I mean that the doctor was using the leather as a shield.
Ray: The birdlike figure of a god worked. Scientifically speaking, it protected the wearer by preventing the fleas from reaching the skin. It had religious value too. The power of the costume prevented the virus from taking over. COMBINATION Some guy who lived in a town saw his friends dropping like flies. He then decided to cover himself up with lots of clothes. He put clothes on that made him look like a bird. Some doctors noticed he didn't get the plague and thought it was a spirit who protected you when you wore the clothes. But what they didn't know is that it stopped the fleas from getting to you. Question solved
Justin: Did the odd bird figure protect doctors? What is your source? How did these people have the technology when they did not know the cause?
Brad: No Justin, the bird man didn't protect doctors. It was the fact that all of their skin was covered and no fleas or rats could pass the disease on to them.
Colin: Brad, I must agree, with their bird suits on, the fleas infecting the patient could not penetrate the skin, spreading the disease.
Ray: The reason that they thought the suit protected was spiritual. The reason it actually protected them was that it kept the fleas off them. Please reread my previous notes.
Alec: This is crazy. It keeps going from spiritual focus to just plain protection and shield edge. Let us first try and get which one is correct. Maybe they're both right. I don't know.
Justin: It's not crazy. It keeps on doing that because we are arguing over spiritual and protection. They are both right because the doctor thought it was spiritual, but it was a shield.
Alec: Well put, Justin. I now understand why it keeps going. Thanks.
Amanda: Maybe that was what doctors wore all the time anyway.
Brad: Amanda, I really truly doubt that doctors wore that all the time because I remember reading something that said those costumes were first used during the Black Death.

This was certainly a form of instructional conversation – but with some important differences. First, the improvable object on which their conversation was focused was an answer to the question that they themselves had posed. Second, the conversation was carried on in writing, which gave participants time to think about their responses before posting them on the Knowledge Wall. Finally, this form of IC had been so well appropriated by the students that they no longer needed the teacher to organize it for them by asking questions and probing for further information. They had reached the stage in their zones of proximal development where they were able to practice autonomously what they had initially learned from participating in similar conversations orally with their teacher.

**Improving a Virtual Object**
The final example of working on an improvable object comes from a doctoral seminar, in which Knowledge Forum, the web-based version of CSILE, was used to continue the instructional conversations carried on in class. The students readily took to the use of this tool for thinking and communicating, but their contributions tended initially to be more like individual monologues than contributions to a knowledge building dialogue. So, in an attempt to increase the dialogic nature of the postings, the first author, who was teaching the course, decided to introduce a different sort of challenge. Following a reading and in-class discussion of the role of artifacts in mediating action and learning, he proposed that the class undertake a joint project: to plan an ideal school in the virtual space of the Knowledge Forum and to explain the reasons for the organizational features they proposed.

The first difference in the subsequent dialogue was in the average length of contributions, which increased considerably as contributors provided much fuller justifications for their proposals or for their reactions to those of others. The second interesting finding was in the mean length of the discussion threads. This increased by 50% compared with those in earlier topics of discussion. And third, there was an increase in the proportion of contributions that made links and references to preceding notes in the thread. Taken together, it certainly seemed that working on an improvable (virtual) object led to more focused and cohesive “conversation” than did the discussion of any of the preceding topics in the course (Wells, 2003). Furthermore, as one of the class members noted,

> Often, we don't get to share our experiences with the material in class (for various reasons: e.g. fear of embarrassment, fear of disapproval, inappropriate time/place, etc.). I think it's valuable for students to share their direct relations to the material and the classroom discussions in a way that is non-threatening. I believe that this encourages community-building. (Martha)

As Martha makes clear in this comment, extending the instructional conversation to the asynchronous medium of the on-line Knowledge Forum had some important advantages in overcoming the inevitable constraints of real-time interaction. Thus, as
many university teachers are discovering, harnessing the potential of the Internet to allow all students to contribute their ideas in a more thoughtful manner can significantly enrich the class’s collaborative knowledge building.

Building on this discovery, the first author decided to use the same tactic in a Masters course for practicing teachers that he was teaching, mainly in distance mode, during the same semester. This group also took enthusiastically to the constructional task. Interestingly, where the doctoral seminar designed a high school and focused much of their attention on the organization of the buildings and rooms within them to allow for a variety of participant formats – students working on their own, in collaborating groups, or in teacher-led seminars – the teacher group chose to design an elementary school that also functioned as a community and adult education center. In their case, it was the challenge of creating functional connections between the various user groups that they found most stimulating and rewarding.

In both cases what was clear, however, was that working to construct a specific object brought our weekly readings alive and encouraged the students to go beyond the typically abstract discussion of the “implications” of the theories being studied. Constructing a particular – though virtual -- school required them to consider how, in bricks and mortar, in the choice of resources and the ways they were to be used and – most importantly – in the social and professional relationships between the various groups involved, the theories being studied could be most effectively realized in practice. This, as both Dewey and Vygotsky argued a century or so ago, is the true test of, and spur to, real understanding.

Conclusion
As we hope to have shown in this chapter, conversation is the essential mediator of cultural learning at any age, from infancy to adulthood, and in all settings in which people are engaged in joint activity. In the classroom context, however, the particular merit of instructional conversation is that it capitalizes on conversation as the means for students’ systematic intellectual development and identity formation, by drawing on each student’s personal experience, in school and out, and by bridging between class members’ joint actions and their shared understanding. As a variety of observational studies of classrooms have shown, students’ hands-on activities without conversation, in which the significance of what was done and observed is collaboratively explored, all too often leave no impression other than the “fun” experienced; but, equally, teacher-directed instructional talk which does not connect with action, ongoing or envisaged, is likely to be as quickly forgotten. By incorporating students’ contributions as well as the instructional goals specified by the curriculum, instructional conversation functions as a crucible in which all the relevant ideas and experiences are brought together and melded into an improved understanding and potential for future action.

In a recent description of instructional conversation, Dalton and Tharp (Dalton & Tharp, 2002) state:
Ordinarily, IC takes place in small groups, though a teacher may have instructional conversations with larger groups or individuals. For example, teachers may work on a unit or thematic topic with the whole class, followed by small group ICs that focus on researching and analyzing selected aspects of the large group topic. Teachers combine ordinary conversation’s responsive and
inclusive features with assessment and assistance to help engage students and stimulate their learning. While any good conversation requires some latitude and drift in the topic, the teacher's leadership is used to focus on the instructional goal. While the teacher holds the goal firmly in mind, the route to the goal is responsive to student participation and developing understanding (p. 191).

They also propose as one of the criteria of successful IC that the teacher “guides the students to prepare a product that indicates the instructional conversation's goal was achieved” (p. 191).

In the preceding examples we have illustrated these characteristics of IC and shown how they can be suitably adapted to a variety of educational settings, from a primary grade class to a doctoral seminar, across the curriculum from the physics of motion to change over historical time, and in different modes - speech, writing, or through computer-mediated communication. In each case we have also shown the importance of “an improvable object” (the “product” referred to above) in providing a focus for students’ activity. In particular, as the last two examples show, when students take ownership of the creation and improvement of such an object, they can continue the instructional conversation without the need for the teacher’s moment-by-moment participation, determining for themselves the extent to which their goal has been achieved.

As Tharp and his colleagues have strongly argued, instructional conversation is the epitome of assistance in the zone of proximal development. And, as such assistance should always do, IC provides opportunity for students to appropriate the different disciplinal modes of making meaning so that, over time, students become able to engage in such dialogue autonomously, in conversation with their peers, in transacting with written texts, and in thinking in the mode of inner speech. On these grounds, we fully concur with Tharp and Gallimore (1988, p. 111) when they write: “To most truly teach, one must converse; to truly converse is to teach.”

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Notes

1. Mari Haneda’s research was supported by a Post-doctoral Research Fellowship from the Social Sciences and Humanities Research Council of Canada.

2. This distinction is largely conceptual as any form of construction has both aspects: as well as its material form any artifact also has symbolic significance with respect to the
knowledgeable skills involved in its creation and use; equally, a symbolic artifact such as a theory can only function in the social world when embodied in a physical object such as a book or diagrammatic representation.

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