

# The Generative Dance in Pursuit of Generative Knowledge

Caroline Haythornthwaite<sup>1</sup> (haythorn@uiuc.edu), Karen J. Lunsford<sup>2</sup> (klunsfor@uiuc.edu), Michelle M. Kazmer<sup>3</sup> (kazmer@lis.fsu.edu), Jenny Robins<sup>1</sup> (jrobins@uiuc.edu), and Muzhgan Nazarova<sup>1</sup> (nazarova@uiuc.edu)

1. Graduate School of Library and Information Science, University of Illinois at Urbana-Champaign, 501 East Daniel, Champaign, IL 61820.

2. Center for Writing Studies, Department of English, University of Illinois at Urbana-Champaign, 208 English Building, 608 S. Wright St., Urbana, IL 61801.

3. School of Information Studies, Florida State University, 101 Louis Shores Building, Tallahassee, FL 32306-2100.

## Abstract

*This paper describes how a group working around the emotionally-charged topic of cultural and linguistic appropriateness created new knowledge about practice, and in particular practice about keeping a knowledge problem constantly open for inquiry. The group's work focused on the creation of a database of materials to support and educate practitioners in their field. Interviews with 23 participants revealed that key to their success was learning and growth in understanding the importance of opening up discussion on what "appropriateness" meant to group members, assumptions about appropriateness, and how to approach appropriateness on the way to deciding what to include in the database. Moreover, the group learned how to discuss and move forward a project based in the discussion of "hotly contested" areas in the face of "passionately held" beliefs. Cook and Brown's [5] view that new knowledge arises from a generative dance between what knowledge is possessed by the individual and what is inextricably linked to practice, resonated with the kind of interaction and problem solving we found in this group. We adopt their perspective to interpret our data and further appropriate their terminology when we refer to and identify generative knowledge: an epistemically productive kind of knowledge predicated on constant openness, and characterized by repeated evaluation and interpretation of a problem.*

## Acknowledgements

This work is supported by an NSF, KDI grant (award 9980182), and has benefited from discussion during a working group on scientific collaboration supported by the National Center for Ecological Analysis and Synthesis. The findings do not necessarily reflect the views of these agencies. Thanks go to members of our Distributed Knowledge Research Collaborative (DKRC) for discussion and input during the progress of this work ([www.dkrc.org](http://www.dkrc.org)).

## 1. Introduction

In 2001 we began interviewing members of a group – referred to here by the pseudonym ECAT – working on the creation of a database of culturally and linguistically appropriate materials for practitioners in their field. Interviews with 23 participants revealed that a key part of the learning entailed in getting their work done was about how to approach the issue of “appropriateness” on the way to deciding what to include in the database. The problem of exchanging knowledge around this emotionally-charged topic seemed to go beyond taking the tacit knowledge ‘in their heads,’ or their practices and experience, and making it explicit for others. Instead, solving this problem involved exploring and evaluating notions of appropriateness, making a definition and application that would be constantly open to thought and interpretation.

In coming to understand the operations of this group, we found the view presented by Cook and Brown [5] that knowledge is both possessed by the individual yet also, inextricably, present and expressed in practice, resonated with the kind of interaction and problem solving seen in the ECAT group. In this paper, we adopt Cook and Brown's perspective of the *generative dance* to interpret the experiences of members of the ECAT group. We also appropriate their terminology when we refer to *generative knowledge*, a term we use to name the kind of epistemically productive,<sup>1</sup> constantly emerging knowledge we found created by ECAT as they came to describe an approach to the difficult issue of appropriateness, and to create a framework within which the judgment of appropriateness could be constantly held open for examination.

### 1.1 The Generative Dance

The knowledge management literature gives us many terms for talking about how to bring forth tacit knowledge – i.e., that which is embedded in practice and in know-how, and possessed ‘in the heads’ of individuals – to

<sup>1</sup> We thank Allen Renear for suggesting the use of this term.

make it adoptable and repeatable as common practice and codified information, i.e., as explicit knowledge (see [13], [14]). Such tacit knowledge is often treated as static, something held by the individual which can be released by finding the right key, teaching method, writing style, or interview technique, and then transferred to others. However, while important for technology transfer, and the creation of routine, repeatable performance, as Cook and Brown [5] note, this view does not explain the creation of new knowledge, and in particular creative production by teams or other groups rather than by individuals. In the work of Cook & Brown, we find a more nuanced view of such tacit and explicit knowledge, and one that includes knowledge in groups and in practice.

Key to Cook and Brown's view is identification of the difference between *knowledge* that is possessed by its owner and *knowing* that is demonstrated and enacted as part of action. 'Knowledge' is seen as "*a tool at the service of knowing*" (p. 388), something brought into the action to be used during practice – e.g., as a psychologist might bring theories of analysis into a therapy session – while 'knowing' "is about interaction between the knower(s) and the world" (p.388) – e.g., as the psychologist modifies technique and direction during interaction with a patient.

While 'knowledge' and 'knowing' may be mapped onto the categories of explicit and tacit knowledge, in Cook and Brown's interpretation 'knowing' is considered inseparable from practice and interaction with the world. They see explicit and tacit knowledge as two distinct forms of knowledge: while we may try to articulate what we do in practice, this does not separate our knowing from our practice, nor can such an articulation make a person proficient at practice. While "each form of knowledge can often be used as an aid in acquiring the other," e.g., in receiving instructions on how to ride a bicycle, "neither tacit nor explicit knowledge can be used by itself to acquire the other: one must also, at the very least, get on a bicycle" (p.385).

Cook and Brown consider knowledge 'in the head' to belong to an *epistemology of possession*, which they see as insufficient on its own to explain how new knowledge is generated. They argue for adding a parallel *epistemology of practice* so we can "speak about the epistemic work done by human action itself – that is, about what is *part of practice* as well as what is *possessed in the head*" (p.382).

Important for the work presented here is that their view presents a framework for understanding the generation of *new knowledge*, and particularly knowledge in groups: "For human groups, the source of *new knowledge* and knowing lies in the use of knowledge as a tool of knowing within situated interaction with the social and physical world" (p.383), i.e., we must bring the knowledge in our heads into play in actual situations in order to go forward in what we know. Through conversation with others in the

social world, and/or interaction with objects, devices, etc. in the physical world, the knowledge we possess is used in practice and "dynamically affords a *generative dance* within which the creation of new knowledge and new ways of knowing is possible" (p.393).

This generative dance is directed and interpreted. It is directed because it is performed as part of a "productive inquiry" ([5], citing Dewey), i.e., an active engagement in a problem, in pursuit of an answer to a question or inquiry. Individual and joint activities associated with this dance are intentional, not incidental, as is also the learning achieved by individuals and the group, and interactions associated with the inquiry (see [16] re intentionality and knowledge-building communities; [11] re design and participation in collaboratories).

It is interpreted because its form and outcomes differ according to the local knowledge, inquiries, and practices associated with the community in which the dance is performed ([2], [3], [6], [10]). It is also interpreted as individuals incorporate the new knowledge into their own world view, readjusting their thinking according to evidence, arguments, or directives stemming from this new knowledge. Moreover, as the new knowledge becomes a way of knowing, it is exhibited outside the head. It is embodied in new practice, becoming new tacit knowledge associated with and expressed through local, often physical, conditions and actions such as new procedures, routines, physical skills, communities, or technologies.

The generative dance is an important phenomenon to examine, particularly where the interest is in new knowledge and knowing, or "knowledgeability" as it is expressed by Orlikowski [15]. Current initiatives in interdisciplinary and multidisciplinary work, as well as in alliances and joint ventures, start with a premise that the combination of elements will create something new. Yet how does this proceed? How is the generative dance enacted?

This remainder of this paper explores the generative dance for the ECAT group whose productive inquiry focused on the creation of a database of culturally and linguistically diverse, yet appropriate, materials. In examining how this group managed this task, many elements of the generative dance became evident, including incorporation of new values into the practices and the product of the group (i.e., the database, its contents, and decision making procedures for evaluating potential content). We find that this incorporation involves more layers of practice and product than might be envisioned by a singular view of where new knowledge will be found. In particular, as the group dealt with discussion around the sensitive topic of cultural and linguistic appropriateness, they learned how to discuss sensitive issues and how to establish and run meetings that allowed for exchange of views. This learning runs parallel to the more 'concrete' learning of what

constitutes an ‘appropriate’ material, or even the process now used to select materials. In what follows we explore not only how the generative dance proceeded, but also the layers of learning and new knowledge it entailed for these group members.

## 2. The “ECAT” Group

While details of the field in which ECAT was involved will not be given in depth here in order to help preserve the anonymity of the group, a few characteristics are important. The project was funded in 1996 for five years by U.S. government grants, and participants include university faculty, graduate students, advisory board members, field practitioners, and database developers. Participating organizations include two universities, a government-supported organization maintaining information systems for education-related literature, and an international professional organization for practitioners in the field. The ECAT project addressed the creation of a repository of educational materials to help practitioners providing services in this field to different races, languages, and cultures in the U.S. As such, there was an emphasis on evaluating materials not only for their scientific validity, but also for sensitivity and correctness in portraying different peoples and addressing their day-to-day circumstances. At the time of writing, the project has officially passed its five year lifespan; the database is in place and considered a great success with over 4000 materials included, well over the forecast 500. Principal investigators are seeking further funding to maintain the database as an ongoing resource.

## 3. Data Collection

Data were collected in a series of semi-structured interviews conducted by the authors in 2001 and 2002. Interviews were taking place during the last six months of the five year project, and up to six months after. None of the authors are associated with the ECAT project, nor do any of the authors work in the same discipline or department as members of the ECAT project. This project came to the attention of the authors in connection with work looking at distributed knowledge processes and collaboration in research teams as an example of a successful collaboration that was nearing the end of its mandate.

Interviews were conducted with 23 members of the project, including faculty, graduate students, project coordinators, board members and database designers. All have been interviewed at least once, and all but a few twice. All interviews were tape-recorded and transcribed; where possible they were conducted face-to-face, otherwise by telephone. Each interview took from 1 to 1½ hours; transcripts range in length from 3,000 to 15,000 words (9 to 20 pages) per interview.

ECAT members include four Principal Investigators (PIs) working at two universities (three interviewed), and two management staff involved in the running of ECAT (both interviewed). There are 16 collaborators on the database construction and management, who worked at the participating organizations and in various university departments (eight interviewed), and two web designers (both interviewed). Early after its inception, a national advisory board was created to increase the diversity of cultures, regions, and institutions with a voice in the work of ECAT. Board members came from across the U.S., representing regional and national cultural groups, and educational groups (five interviewed). Finally, there were many graduate students involved in ECAT, coming and going over the years of the project (four were interviewed).

Interviewees are identified by a set of initials (which are not their own), and a group designation: STAFF for PIs and management staff (5); BOARD, for board members (5); STUDENT, for graduate students workers and assistants (4); DATABASE for information and database specialists involved in database specification and development, including web design (9). These categories are broad, again to help protect anonymity of respondents.

Interviews and analysis proceeded using a grounded theory approach [17]. Discussions of results from the first set of interviews were used to guide questions for the following interviews. Analysis consists of coding the data looking for themes relating to the category of main interest, which for this paper has been the generative dance around sensitive issues, comparing across individuals for commonalities and differences and analyzing the characteristics of the themes that emerged.

The first interview collected data on the role of the individual in the ECAT project, e.g., their position and involvement in the work and discussions, as well as their general impressions of the work process. A series of questions asked about the development of the database and the discussions around that work, their role in those discussions and that work, their characterization of the process (we asked for a metaphor to describe working on the database and the project). We explored the chronology of the project, their contributions and how these changed over time, changes in assumptions over time, and challenges and problems during the project. We also asked how their knowledge and expertise were brought into the project, and how they represented the database to others. The second interview followed up relevant threads from the first interview, particularly exploring their take on the meaning of ECAT, whether (and how) perceptions of what it meant changed over time, and what they perceived as its impact at what was then the end of its five year lifespan. Questions also asked about knowledge exchanges and interactions by asking extensively about what they learned from others and what others learned from them.

## 4. The Generative Dance in Pursuit of Generative Knowledge

While there are many avenues of exploration in the rich data from the 23 interviewees, we concentrate here on the topic that emerged as a cornerstone to the group's operations: the enactment of the generative dance around difficult and sensitive matters. The dance is most evident in how ECAT members came to share understanding of how to approach cultural and linguistic appropriateness, and how to understand and represent multiple voices in their final product. We term this *generative knowledge* because what ECAT members were creating was not an answer to a problem of 'what is appropriate' but rather a way to approach the question, a framework within which appropriateness could be examined. In this way such knowledge is epistemically productive as it opens the conditions for the further creation of knowledge. Key to their work has been uninhibited discussion of the "assumptions" about cultural and linguistic appropriateness that underpinned the selection procedures for materials for the database. The discussions led to incorporation of values into individual's practice as they came to understand in a new way what it meant to support cultural diversity. They also were instantiated in group practice in the guidelines for reviewing materials for appropriateness, and the instructions to users on how to approach and use materials in the database.

Interviews reveal that the success of these discussions (which built, in turn, the success of ECAT) depended on sharing "voices" representing different views, different cultures, and the creation of an environment in which such sharing could take place despite differences in outlooks. However, sharing alone would not have been enough. Success and trust in the process also depended on the visible and evident integration of what was voiced in those discussions into both other individual's world views *and* the structures of the project. Participants needed to see that others associated with ECAT had taken their opinions and incorporated them into their own values and approaches, as well as into review guidelines for materials, and into the database.

In keeping with the generative dance, the group's focus on its intended product – the database of culturally and linguistically appropriate materials – acted as the constant reference point for their "productive inquiry." Discussion of its contents, the proper way to evaluate materials for it, and how to train reviewers to do that evaluation, served as an embodiment of their goals, a way of presenting explicitly the tacit knowledge they were accumulating through group interaction. It also acted as a way of showing how changes in those views were updated, revised and made visible, e.g., through changes in database content and guidelines for that content.

Moreover, the development of *guidelines* for evaluation of materials, rather than instructions for how to

accept or reject of materials, reveal the epistemologically productive aspect of their work. Guidelines, as well as training sessions for material reviewers, were designed to create active engagement by non-ECAT members in decisions about appropriateness, examination of their own assumptions about appropriateness, and where and how to use materials found in the database or elsewhere.

In exploring further how the generative dance was enacted in ECAT, our discussion highlights these aspects of the group's inquiry and outcomes:

- how the generative dance unfolded around the emotionally-charged "hot" topic of cultural and linguistic appropriateness
- how the visible instantiation of discussion outcomes into individual and group practice built trust among group members
- how group members learned to engage in the generative dance, and in particular how to engage in the generative dance around a sensitive topic
- and the layers of learning and knowledge their dance entailed.

### 4.1 The Generative Dance around Difficult and Sensitive Practices

It was impossible to ignore from our interviews the key importance of the sensitive nature of the foundation to the group's activities – i.e., the nature and meaning of linguistic and cultural "appropriateness." This theme, and the "hot" discussions around it, appear centrally through the 46+ hours of the interviews, mentioned by every participant regardless of their role – whether a database developer, student or PI. As such it represents a distinguishing feature of this group that differentiates it from the kinds of work or project teams often considered when dealing with knowledge issues.

Early in the group's mandate, members faced determining what constituted "appropriateness" with respect to the materials for the database. At the same time, they had to face their own personal biases and assumptions about what was appropriate, what it meant to be in a position to dictate that appropriateness to others as materials were chosen for the database, and what it is like to be non-white or not part of the mainstream culture of the U.S. Passionate discussions opened up "what kind of cultural assumptions are being made about the materials, and about the practitioner [who would use them], about yourself [as a member of ECAT]" [VF, DATABASE]. The ECAT staff (PIs and management) did not themselves represent a great range of cultures—a point brought home to them by the advisory board whose members had been deliberately selected to represent a greater cultural range. Meetings, particularly the first meeting with the advisory board, were 'hot.' These "hot button topics" [VF] were "very, very, very hotly debated" [FP, STUDENT], and

“hotly contested” [KU, DATABASE], by “people who felt really passionately about having been excluded” [VF].

As our interviewees explained, the problem in addressing diversity is that as we strive to include one voice, we may exclude another; and if we cling to one view of appropriateness or view situations through only one lens, we exclude or fail to see the possibility of other views. Dealing with diversity is a difficult problem, and such difficulties should not be reduced to the simplicity of a lack of desire to solve the problem or an inability to comprehend it. The problem is complex, and conditions vary with context, yet we tend to approach them in a simplifying manner. For example, our discourses often favor similarity over difference (see [4] for a discussion of this problem for talking about “communities”; see also [7]). Interviewees pointed out how we simplify differences by language when there are multiple variants of culture to go with each language (e.g., the multiple U.S. and non-U.S. cultures that make up Spanish speakers); and we simplify diversity in culture by identifying people from one race as one group (e.g., the many nations that make up the Native American population). Simplifying categorizations such as these can put undue burden on people to speak for many cultures, and not necessarily ones with which they are familiar. They can unduly shape the way we view problems and thus what decisions we make about data collection and organization ([1], [18]).

There are parallels also in how we simplify to make knowledge mobile. We strive for the generic, the reproducible, and even the transdisciplinary [8] when we seek to take what we know in one modality and use it in another. In our efforts to make knowledge mobile, we move away from local conditions to find what holds across all environments [3]. Re-writers, practitioners, and users are left to translate and fit these generic materials to their local environment, people whose expertise is in knowledge and ways of knowing about local conditions. They re-embed into local context what has been disembedded for mobility (Giddens, cited in [3]).

The ECAT group set out to explore and integrate diversity into their work, and to bring together a set of materials that re-embedded diversity into materials for practitioners in the field. Their knowledge problem was mobility in reverse, yet it was not a static, one-off operation. They also had to keep the problem open and continuously interpreted. Unlike many knowledge mobilization situations, the goal was not to come to a common answer to a problem, but instead to a common approach to a problem. Recasting the problem in terms of creating a process rather than finding an answer or creating a product appears to have happened as a result of the “facilities and frustrations” ([5], p. 389) afforded by interaction with their social world – one that included those both experienced and inexperienced in handling cultural diversity.

In their first interactions, ECAT members found dramatically, in a hot encounter, that their first challenge was to understand what they meant by diversity, and by cultural and linguistic appropriateness. Cook and Brown [5] write of the difference between individual knowledge and knowledge held in common by the group. In their example, a doctor knows how to use his or her hands to make a diagnosis, but only medical groups know what constitutes acceptable practice for that diagnosis. While some ECAT members knew appropriateness for some cultures, they did not individually cover all cultures for whom they wanted to select materials; and while some members had ideas of what “appropriateness” meant, as a group they did not yet know what constituted acceptable practice. Through conversation and interaction with the world – in this case, social interaction among board members, PIs, staff, and students – they came to develop their own new knowledge about appropriateness, one instantiated in the heads of those who possessed it, as well as in the actions of the group as it established routines for reviewing and incorporating materials into the database.

## 4.2 Building Room for Trust

The heat of this issue and ensuing discussion – particularly at the first board meeting – might have sunk the whole endeavor, but it appears that processes during the first meeting established quite a different long-term tone:<sup>2</sup>

When we first met the advisory board and the staff, and explained what the purpose of the project was and what our mission was ... and what we wanted to accomplish, I think one of the first things that had to be discussed were the assumptions that we wanted to put forth and I think that was one of the most *interesting* and challenging and *productive* sessions that we ever--, I ever witnessed in my working career ... in terms of a very sensitive issue of cultural, linguistic differences in that area. And it was so exciting *because we--*, some of us knew each other but we, none of us knew *everybody* and to see a room full of people coming forth and being able to feel what we want to call *secure* to discuss issues that were very, very sensitive and lay on the table as it is, was very *rare* I would say for an initial advisory board meeting to come up with these assumptions. And I think that was a real highlight of the beginning of this exciting project and ... why it was so successful that the staff got to make us feel this way, how to be so

---

<sup>2</sup> Although not discussed here, many interviewees credit the skills of one of the PIs of this effort as instrumental in creating the open atmosphere for discussion at board meetings and elsewhere.

comfortable and letting it be discussed like we wanted to say it. And I think from then on I think the honesty and integrity of the advisory committee to the staff was ongoing and consistent and *sincere*. [EO, BOARD; italics indicate vocal emphasis]

Such comments on the positive outcomes of the first meeting are echoed by others of the advisory board members as well as staff members, such as this interviewee who elaborates further on how trust developed around this work:

We all knew that we had to find a way to be able to communicate to each other. To the degree ... where people would feel comfortable, with sharing things. To the degree that each individual was comfortable, is different. I think it has a lot to do with the trusting. What helped people a lot I think to me was that, if they see that if they say something, and if the-, and if there's enough discussion that went on around it, and if there was a change that was made towards addressing that issue, then that made it, that reinforced that person to be able to continue sharing ... and talking in that environment. And I think in many ways that was something that we had nurtured with our group where everybody's voice was valued, and that was important ... I always say, it only would take one person and we could make a change. Because you know that possibly a lot of other voices would probably feel the same way. ... I think a lot of it is, like, if people see that you're changing, or that there's a change, you're not totally rigid and resistant to it, then I think that really helped a lot in creating that trusting and nurturing environment. [BL, STAFF]

The kind of trust fostered in the meeting is not the creation of friendships (“we didn't all have to love each other and be friends and chummy” [BL]). Instead members forged relationships around a common, productive inquiry, working together with a chance of making a difference, achieving the “impossible dream”:

It became apparent that this was an opportunity that had never existed before and it was an opportunity to make a real difference and that-- *If* you wanted to make a real difference you had to talk about the difficult stuff. Otherwise ... it would be just any other project ... you get it and you put an effort in it and you go away and it sits on somebody's shelf and you *never* look at it again. But, I think the people [PIs and staff] ... were committed and they picked people for the advisory board that were passionate about the issue and felt that this was really hard work but if we were going to put our time to do it then we

were going to do it right...  
[later in the interview]

It was such an *impossible dream*, ... even though we were giving input I marvel that they were able to create this wonderful thing ... Working on something that was going to really make a difference ... something that was going to be useful to the field that was going to make its marks and not just a flash in the pan, here and gone. [WG, BOARD]

Yet, on its own, trust during meetings would not have been enough. To come back to the table and to contribute again, participants needed to see the knowledge and ways of knowing exhibited and shared at meetings become part of the practice of ECAT. They saw this both *explicitly*, in written documents and procedures:

All along the way, even with the result of that meeting, we talked and talked and *talked* and *talked* and for her [one of the PIs] and her staff to come back for the next meeting with these assumptions written was *absolutely phenomenal* because we talked in so many different directions but yet she was able to *capture* the essence of what we were trying to *say* in terms of our assumptions and I couldn't believe that, I really could not believe that, that that could be written and a lot of us felt that way, I think. [EO, BOARD]

I think through discussion with our advisory board members and then good communication. [One of the staff] would send things back out to people and get clarification on the listed assumptions and “Does this look right?” and “Are there changes?” And then, at our next advisory board meeting reporting what had been done and then, “Were there any other considerations?” So that feedback loop I think was really important. [CM, STAFF]

and *tacitly*, in incorporation into others' practice, for example:

[One of the PIs] admits she has learned... the *growth* of the staff was *unbelievable* ... their sensitivity of what they were not aware of ... unawareness because they never had that experience [EO, BOARD]

Trust emerges as a mediating factor in group processes in two ways. First, trust regulated the extent to which members were willing to share experiences and give input for the project. As the advisory board and others gained trust in the ECAT staff and its processes, e.g., as they saw staff incorporating their views into the ECAT project effort, and as they saw the opportunity to do something of

lasting value, the more willing they were to contribute to discussions. Trust in the staff mediated the desire to add input to the whole project. Second, trust regulated the extent to which input was incorporated into the project. For example, ECAT staff gained trust in the process as their own efforts were accepted positively by board members. Trust in the relationship between board and staff increased the willingness and ability to incorporate input into the work.

Meetings with the advisory board were only one of two major examples of the way the ECAT group members had to confront the challenging issue of talking about sensitive issues. The other example relates to the graduate students, who again represented a greater range of cultural and linguistic diversity than the principal investigators and management staff. Knowledge inherent in the experiences of the graduate students had to be recognized, and then incorporated into ECAT practice.

I remember [we] came up with a couple [of] suggestions about how they might want to work with doctoral students in a way that allowed them, the managers, to pull out the information from the graduate students, but at the same time forcing the managers into a position where they are going to have to learn from the graduate students because they did not have that information... I remember talking about and laying out a process by which that kind of a collaborative work could happen, and might happen and I remember they did do that. And it did have a very positive impact in terms of the doctoral students that they have there- in terms of their own professional development, but at the same time it also provided a venue for what I saw as a very positive growth of the part of the managers as they became more in tune with the kinds of issues that they were trying to learn and develop. [OY, BOARD]

Again, the report suggests that the evident action on the proposal regarding the graduate students, and its incorporation into management's values, was important, at least to this board member. It is not as clear what trust was built between ECAT staff and students. Many students stayed through to the end of the project, but some moved on to other endeavors. However, reports from some interviewees suggest that a mid-course correction improved the way student experiences and opinions were incorporated into ECAT.

As we examine this group, we see that at the same time we learn about their generative dance, we might also say we learn something about the dance hall, hence the title of this section as building a "room" for trust. Since talking about cultural diversity can be very sensitive, with each person in the room having 'their own story' and their own cultural view, to engage in the dance, the hall must be

secure. Fellow dancers must be trusted: organizers must be trusted to do something with the effort that is put into the engagement; and advisors must be trusted to speak for more than themselves. In the dance hall of the ECAT advisory board meetings, space developed for sharing of views, a place where "everybody's voice was valued" [BL]. Moreover, it was a place where productive inquiry took place, with everyone working to make a contribution that was "ongoing and consistent and sincere" [EO].

### 4.3 Generative Knowledge: Knowledge, Knowing and Open Production

Generative knowledge, as we have termed it here, is evident not only in the way interaction among ECAT members approached the problem, but also in how they then presented that problem to others. They do not present a solution, but rather a way of approaching the problem. Here one of the staff members explains how they present the ideas to those who come to the ECAT project from outside the group. This quote also describes how they had learnt to accept the "tension" of the generative dance, and accepted that as part of the process of dealing with this sensitive issue.

It's always been hard ... to talk about issues of culture... so we have tried to take it head on and we made our assumptions about culture and diversity explicit on our website, explicitly stated to the people who come to us. It's something that when we go out into the field, we're encouraging people to make their own explicit assumptions about culture and language and diversity explicit. When you write a material, we're encouraging developers to put that ... in as part. It became very readily apparent we'd call a developer [of materials] and the standard answer is that "It's universal," that "It wasn't developed for any particular culture, there are no cultural values intended to be in the material." That's just simply not true. Every material has values implicit in it. So these sort of assumptions are what we are trying to challenge folks to make explicit. So of course to make our assumptions explicit as a group of people [took] a lot of dialog, some of it painful, decisions that we were going to have to live with tension, that that tension is not a bad thing, that creativity comes out of tension. That that was going to have to be and that was neither good nor bad; it just was. [DN, STAFF]

The kind of knowledge produced by this group is itself generative, i.e., composed of components of both knowledge and knowing continuously enacted through interaction with members of the social world and artifacts from the physical world (e.g., materials for the database).

While much work on knowledge in organizations works on existing or ongoing knowledge in a relatively stable social structure (i.e., the structure of the organization is stable, even as people may come and go within it), ECAT was breaking new ground, breaking in new participants, *and* breaking in new processes. ECAT members came to know how to enact a generative dance around a sensitive subject. They – as individuals and as a whole – learned not just how to assess, evaluate, talk about, and think about cultural and linguistic appropriateness (a learning of practice), but also how to *effect* discussion and productive inquiry around such a theme (a learning of meta-processes around practice). Just as Orlikowski [15] found that a key to success in the multi-national Kappa organization was “a collective competence in knowing how to deliver innovative yet complex products in a timely fashion,”(p. 256), a key to ECAT’s success was that it *developed* a collective competence in knowing how to conduct productive inquiry predicated on inclusive representation of diverse sensibilities. By the end of its five year lifespan, individuals and the ECAT group as a whole had learned how to create an environment in which such a generative dance could take place.

Key to the generative aspect of this knowledge is that it is continuously open for examination. This openness corresponds to Latour’s [9] concept of *negative modality*. He suggests that in scientific writing a positive modality is found in statements that lead away from the conditions of production. By contrast, negative modalities lead toward the conditions of production; these are “opened up and many specific conditions of production will be added” ([9], p.43). One of the questions asked in interviews was whether there were topics with a lot of discussion, and whether there were topics around which there was ‘no’ or ‘little’ discussion. A typical response to the latter was “I don’t know if there was *little* discussion on *anything!*” suggesting everything was open for examination of the ‘conditions of production.’(Interviews suggest that only aspects of the technical definition of the database received little discussion.) This same person continues:

There was always a lot of discussion on *everything* and it’s not that people *disagreed*; it was people wanting to make sure that everybody *understood* ... everybody’s perspective. [WG]

Thus, we have the interesting situation of having a productive inquiry toward a database, open to continuous discussion of the conditions of production. A common situation for new work, new knowledge, and new groups, yet one that in its generative state represents a markedly different challenge than the management of problems with more well-defined conditions of production.

#### 4.4 Layers of learning

Members of ECAT shared their knowledge and experiences as members of their culture, professionals providing service to members of different cultures, educators teaching future professionals, administrators and consultants for regional programs, and experts in subfields associated with the project. While sharing knowledge about diversity in practice, they constructed something new for the group – the “assumptions” which became outlined in a written document. As well, individuals learnt from and about others. They incorporated into their own views new ways of knowing:

The goals have not changed... It’s how we were getting there that kind of changed a lot. And a lot of it is through our own learning process, and how we were ... thinking about things and doing things ... [*and later*] ... When you’re talking about culture and language, the issues of racism and power comes up, but when ... you’re also around people who deal with these issues, ... these are the same people who also are very open to understanding and listening to others because that [*is the*] kind of the thing that you do. You’re developing this competence to be able to talk to people who sh-, who may not share your values or beliefs and so, it’s almost *innate* within that particular group and that to me was helpful. [BL]

There is learning not just about other people’s experiences, but also in how to relate to others who have these experiences. The learning includes both knowledge about what it is like to be outside the mainstream culture of the U.S., but also knowledge about how to talk about it, and eventually how to create a working group around the discussion of it.

#### 5. Trust, Production, and Creative Progress

To summarize the activities and work of this group, we present five themes (or activities in Orlikowski’s [15] terminology) we identified from our interviews that relate to the achievement of knowledge creation and exchange in ECAT (outlined in Table 1). These themes emerge in relation to the type of knowledge problem faced by this group. Their task is not technology transfer, nor is it a master-apprentice inculcation of practice. It is instead a coming to understanding of process – i.e., how to maintain a continuously open approach to a difficult problem. The topic is hot and sensitive. There is no one right answer but rather a process to be learned. It is a constantly open problem that doesn’t reach closure, and has no explicit definition or codification except in how to unfreeze, unbundle, recombine, question foundations, and open premises for examination.

*Developing trust* is a necessary starting condition for exchange of any sort, and one much discussed in the knowledge management literature. Face-to-face meetings brought together ECAT participants for discussion. Action based on these discussions, as well as the obvious incorporation of discussion points into products and practices acted as catalysts for more trust. Along the way, participants came to know each other and how they could work together on this problem in this context.

*Engaging in productive inquiry, Maintaining openness, and Doing the generative dance* are each part of the active process of moving the project forward. *Engaging in productive inquiry* entailed maintaining a focus on the topic of inquiry, its relation to the database product, its eventual users and preferred design characteristics. This focus gave purpose to discussions, and a goal to keep in mind. While the goal of a collection of materials was known from the beginning, the discussion allowed refinement of how the goal would be met in practice.

*Maintaining openness* is a key factor in dealing with this kind of knowledge problem – a topic that must constantly be kept open for examination, where the knowledge that can be gained is not an answer to a specific question but instead a way of doing and thinking about things. As one interviewee described, there were cultures and languages for which materials were being selected when no one on the board or staff came from that background or knew about it. What had to be put in place was a process that could deal with that, not an answer for any specific combination of culture, language, race, etc.

*Doing the generative dance* entails change in outlooks, incorporation of new viewpoints, synthesis into one's own world view, accepting the creative tension. Its acts both inwardly, changing the views of the recipient, and outwardly, effecting change in another's viewpoint. Doing the dance requires contribution, receptiveness to change, and focus on the chosen inquiry.

*Creating productive process* is another theme that is important for the kind of knowledge dealt with here. Accepting open evaluation of diversity entails instantiating this principle into how work gets done. It's not a surface level adherence to procedure, nor the acquisition of master level expertise that can be applied to production of another database. It is instead a meta-level skill, one that operates like transdisciplinarity, at a generic, cross-situational level. Individuals, and the group, are learning how to deal with doing the generative dance around difficult practices. Their knowledge is at the level of how to do this kind of inquiry again, in another context, and on another difficult practice.

**Table 1: Themes, catalysts and kinds of knowing**

Themes	Catalysts	Kind of knowing
Developing Trust	Face-to-face group meetings Action based on meetings Evidence of acceptance and use of views Seeing impact of views	Knowing about each other
Engaging in Productive Inquiry	Maintaining a focus to discussions Keeping end product in mind Keeping end users in mind Keeping design principles in mind	Knowing (how to achieve) the goals
Maintaining Openness	Listening Incorporating what is heard into products and practice Questioning foundations Accepting no end point Subjugating one's ego	Knowing how to learn (under conditions of generative knowledge)
Doing the Generative Dance	Changing one's own views Effecting change in others' views	Knowing what
Creating Productive Process	Learning how to learn (for this context) Learning about others Learning to keep an open mind Learning how to listen, incorporate, build trust	Knowing how to do the generative dance Knowing how to be a group that deals with generative knowledge

Note: This table borrows its form from Orlikowski [15].

## 6. Conclusion

We have describe how interactions among participants in ECAT, enacted in service of productive inquiry directed to the creation of the database of culturally and linguistically appropriate materials, progressed as a generative dance about how to approach the issue of 'appropriateness' as they made decisions about what to include in the database. While the database content exists as a visible, explicit result from the generative dance, equally important has been the tacit incorporation of values about appropriateness both by individuals and the group as a whole. Members of this group not only do the dance, but learn that it is necessary, on what it is focused, and how it is performed with these others in this context. Moreover, the group gained in knowledgeability about process; they learned how to discuss and move forward a

project that is based in the discussion of ‘hotly contested’ areas, in the face of ‘passionately held’ beliefs.

In engaging in the generative dance, the database co-constructed by participants in the ECAT project has become something much more than an instrumental repository of resources. In purposefully negotiating with each other in a productive inquiry into what constitutes appropriateness, how materials should be evaluated, and how to get these data out to others, they created a narrative beyond the basics of the data (see [12] re databases and narratives). The definition of the database emerges as an instantiation of the meaning of the group, i.e., as the explicit representation of the multiple exchanges and interactions regarding tacit group members’ knowledge. Not only does this database remain as a technological artifact embodying the generative dance so far, it also stands as a base for future work in this area. As such, its definition and existence represents an important stage in a longer generative dance, one that spans ‘generations’ of funding cycles and project definition.

As organizations increasingly include diverse members who span not just nations and national cultures, but also local cultural boundaries – whether based on experiences, traditions, or disciplines – it becomes important for knowledge management to learn how to facilitate discussions in such environments. It is also important to recognize that not all problem discussion leads to a definitive, codified answer. Instead, difficult, sensitive topics need to be continuously open, and this is something that is learned in observing and doing the generative dance around generative knowledge.

## References

- [1] Bowker, G. C., and S.L. Star, *Sorting Things Out: Classification and Its Consequences*, MIT Press, Cambridge, MA, 1999.
- [2] Brown, J.S, A. Collins, and P. Duguid, “Situating cognition and the culture of learning”, *Educational Researcher*, 18(1), 1989, pp. 32-42.
- [3] Brown, J.S., and P. Duguid, “Knowledge and organization: A social-practice perspective”, *Organization Science*, 12(2), 2001, pp. 198-213.
- [4] Clark, G, “Rescuing the discourse of community”, *College Composition and Communication*, 45(1), 1994, pp. 61-74.
- [5] Cook, S.D.N, and J.S. Brown, “Bridging epistemologies: The generative dance between organizational knowledge and organizational knowing”, *Organization Science*, 10(4), 1999, pp. 381-400.
- [6] Engestrom, Y., and D. Middleton, *Cognition and Communication at Work*. Cambridge, Cambridge University Press, 1996.
- [7] Gutiérrez, K, P. Baquedano-Lopez, and C. Tejada, Rethinking diversity: Hybridity and hybrid language practices in the third space. *Mind, Culture, and Activity: An International Journal*, 6(4), 2000, pp. 286-303.
- [8] Klein, J.T, *Notes toward a Social Epistemology of Transdisciplinarity*. Paper presented at the Premier Congrès Mondial de la Transdisciplinarité, Convento da Arrábida, Portugal. Available online at: <http://perso.club-internet.fr/nicol/ciret/bulletin/b12/b12c2>, 1994.
- [9] Latour, B, *Science in Action: How to Follow Scientists and Engineers through Society*. Cambridge, MA: Harvard University Press, 1987.
- [10] Lave, J., and E. Wenger, *Situated learning: Legitimate Peripheral Participation*. Cambridge University Press, Cambridge, UK, 1991.
- [11] Lunsford, K.J., and B.C. Bruce, “Collaboratories: Working together on the web”, *Journal of Adolescent and Adult Literacy*, 45(1), 2001, pp. 52-58. Available online at: [http://www.readingonline.org/electronic/JAAL/9-01\\_Column/index.html](http://www.readingonline.org/electronic/JAAL/9-01_Column/index.html).
- [12] Manovich, L, *The Language of New Media*. MIT Press, Cambridge, MA, 2001.
- [13] Nonaka, I., and T. Nishiguchi, *Knowledge Emergence: Social, Technical, and Evolutionary Dimensions of Knowledge Creation*. Oxford University Press, New York, 2001.
- [14] Nonaka, I., and H. Takeuchi, *The Knowledge Creating Company*. Oxford University Press, New York, 1995.
- [15] Orlikowski, W.J, “Knowing in practice: Enacting a collective capability in distributed organizing”, *Organization Science*, 13(3), 2002, pp. 249-273.
- [16] Scardamalia, M., and C. Bereiter, “Computer support for knowledge-building communities”, in T. Koschmann (Ed.), *CSCAL: Theory and Practice of an Emerging Paradigm*, Lawrence Erlbaum, Mahwah, NJ, 1996, pp.249-268.
- [17] Strauss, A.L., and J. Corbin, *Basics of Qualitative Research Grounded Theory Procedures and Techniques*. Sage, Newbury Park, CA, 1990.
- [18] Weick, K.E, “Technology as equivoque: Sensemaking in new technologies”, in P.S. Goodman, L.S. Sproull and Associates (Eds.), *Technology and Organizations*, Jossey-Bass, San Francisco, CA, 1990, pp. 1-44.