

Lessons learned: Faculty developer and engineer working as faculty development colleagues

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ABSTRACT

In working together to deliver discipline-specific workshops, we have had to focus on communicating effectively with each other. We have come to recognize that our biggest obstacle has been divergent ways of thinking and speaking, due to different disciplinary cultures. The metaphor we now use to conceptualize our relationship and deal more effectively with our miscommunications is 'bridging cultures' and 'crossing borders'. We have learned a great deal from trying to make crossing borders more explicit in our work together; our learnings form the basis of this paper.

Introduction

The paper explores how to conceptualize communication between faculty developers and faculty change agents in a way that furthers effective interaction. Conceptualizing or naming the relationship between faculty developer and change agent creates a mindset or approach to the relationship. For instance, the wording of the 1998 ICED conference theme, 'developing departmental faculty as change agents', very much suggests a power differential, a one-way interaction from faculty developer to change agent. We propose a different conceptualization which suggests a more equal partnership. Using the metaphor of 'bridging cultures' and 'crossing borders', we conceive of our disciplines as different cultures with different world views, goals, and forms of discourse. In order to work together, we try to think of ourselves as tourists or visitors in the other's culture. In this way, just as for a visitor in a foreign country, we are sensitized to the potential for miscommunication, yet intrigued by the other's perspective and, most important, want to learn more. From this basis, we can develop a new shared, common language. (We do not address this here, but we also recognize the different cultures represented in our genders.)

Context

Increasingly the focus of faculty development is on discipline-based activities. This approach recognizes the central role of subject matter expertise in professors' understanding of teaching and learning (Dart and Boulton-Lewis, 1997). Further, it recognizes teaching as community property (Shulman, 1993), worthy of critique by one's disciplinary colleagues. Operating within the discipline-based model entails faculty developers and discipline-trained professors working closely with each other to understand and improve teaching in the professors' units. Yet, there is next to no literature which addresses the nature of this relationship: how you envisage and maintain such an association.

We, faculty developer (Lynn) and engineering professor (Ralph), have worked together intimately in delivering discipline specific workshops. We first came to know each other in university-wide contexts in the early 1990s. The Center for University Teaching and Learning at McGill University in Canada annually offers an intensive one-week workshop for twenty-five professors from across the university. Ralph participated in one of these workshops and our relationship continued as Ralph maintained a connection with the Center, even as he worked on creating a community around teaching in his department and faculty.

Our opportunity to work intensively together on discipline-based workshops came from one of

Ralph's initiatives. He was involved in a project at the University of Chile's Faculty of Mathematics and Physical Sciences, and convinced those he was working with that they could benefit from understanding more about university teaching and learning. As a result, we twice went to Chile to work with professors in the faculty, and with deans, chairs and programme directors. In the process of co-instructing in Chile (planning, teaching and evaluating), we, of course, had to focus on communicating effectively with each other. This was stimulating, challenging and thought provoking – but also sometimes exhausting. In analysing this process, we came to recognize that we were each communicating using our own forms of discourse and world perspectives that represent the different disciplinary cultures with which we are affiliated. We now see that in order to work effectively, we need to understand and value each other's culture, and from this basis develop a new shared, common language.

Conceptual framework

Culture

Culture is a set of thought patterns and behaviours shared by a group (Resnick, 1991), for instance, a linguistic, ethnic or socio-economic group. An important aspect of culture is the individual's choice to affiliate with a particular group (Wolcott, 1991) and to take on the discourse, thought and interaction patterns related to that culture.

The notion of academic disciplines representing distinct cultures is not totally novel, particularly when referring to research, eg Becher, 1989. As well, Alexander, Schallert and Hare (1991, p. 315) refer to research communities as 'exotic cultural groupings of people'. In the professional sphere, this idea is also current. For instance, faculties of education recognize that the learning of the 'culture' lies at the heart of becoming a public school teacher (Olson, 1988). Similarly, becoming an engineer or an engineering professor, or a sociologist all involve learning and then using the cultural manifestations of the group(s) one has chosen to affiliate with. (This does not deny the individual nature of one's choices, based on personality and previous experience, to think and act within that culture, nor the impact of the other cultures within which one lives, eg family, community group, etc.) Why focus on our distinct academic cultures? How might they impact on

teaching and learning? As Jenkins (1996, p. 52) points out, there is evidence that professorial knowledge of the content and structure of their discipline is essential to enable high level learning among students. To ignore subject matter (to be discipline blind) is to ignore an important variable in learning.

Domains of knowledge

Although the structure of subject matter knowledge is important to learning (and to how professors approach teaching), there are other domains of knowledge that also influence learning. For instance, Shulman (1987) described seven domains that impact on one's ability to teach in ways that enhance learning. We focus here on only three, the ones most frequently referred to in the literature linking teaching and knowledge. They are subject matter knowledge, pedagogical knowledge and pedagogical content knowledge. Subject matter knowledge represents the structure and content of the discipline, eg biology, drama. Pedagogical knowledge represents general knowledge of teaching and learning that is used to support student learning. Such knowledge is relatively sweeping, applicable to most settings; for instance, students learn better when they are motivated. This domain of knowledge is frequently the basis for courses on teaching and learning. Pedagogical content knowledge, on the other hand, represents knowledge of teaching and learning that is linked directly to knowledge of a discipline, for instance, how to motivate students to learn and understand thermodynamics. Courses on teaching in particular subject areas would likely incorporate knowledge from this domain.

To summarize, pedagogical content knowledge represents the linking of the structure of the discipline (subject matter knowledge) and general knowledge of teaching/learning (pedagogical knowledge) in a way that provides concrete knowledge of teaching and learning. We believe it is this knowledge that can be most directly helpful to professors. Yet, since few professors have the opportunity to receive training in teaching and learning, they tend to develop such knowledge only from teaching, from the personal experience of interacting with different students in different settings as they teach in their own subject area. This leads us to the next point.

Polanyi (1958) suggested that we hold two forms of knowledge: explicit and tacit. Explicit knowledge has been learned using language, eg

reading a book on how to play golf. This form of knowledge enables us to easily communicate what we know, exchange ideas, develop shared understandings. It is the type of knowledge that we develop when we participate in educational activities, eg attend a course. And it is explicit subject matter knowledge that forms the basis of much discourse among professors.

Tacit knowledge, on the other hand, is knowledge learned from experience, eg going out on a golf course and hitting a ball. It is not directly represented in language, and may never be unless a situation arises where explanation is required and even then it may be difficult to represent in words. We all have experienced situations where we cannot explain what it is that we do when we carry out some skilled activity. Professors all have tacit knowledge related to teaching their subject area that they have developed through experience, resulting in tacit pedagogical content knowledge which is not easily shared, exchanged, critiqued. Transforming it into explicit pedagogical content knowledge is essential if one is to create a community of scholarship around teaching, a community that constructs and shares explicit ideas about teaching and learning in the particular discipline. In other words, linking Polanyi's notion of tacit and explicit forms of knowledge with Shulman's typology of domains of knowledge provides us (Ralph and Lynn) with a way of conceptualizing the different cultural perspectives we each hold, and imagining a way of interacting productively.

Ralph brings to our collaboration strong explicit subject matter knowledge of mining and

metallurgy as well as explicit knowledge of other fields in engineering. (See Figure 1.) He also has tacit pedagogical content knowledge about engineering and mining/metallurgy gained through his experience teaching, that he may not yet have turned into language or made explicit. And, as he has had very little formal training about teaching, he has very little explicit pedagogical content knowledge. So, it is sometimes difficult for him to talk about instruction (teaching and learning) in engineering.

As a faculty developer, Lynn brings strong explicit pedagogical knowledge, general information about how to teach since her academic subject matter expertise is pedagogy; however, she has no pedagogical content knowledge, tacit or explicit, about engineering, or mining and metallurgy. Our job is to jointly construct explicit pedagogical content knowledge in the area of engineering; that is our *border work*. By bridging Lynn's explicit pedagogical knowledge with Ralph's explicit subject matter knowledge and tacit pedagogical content knowledge, we can begin to create a language, a discourse, that can transform the tacit pedagogical content knowledge into explicit form. We can begin to create a language that can make teaching in engineering community property. In the process, Ralph becomes more knowledgeable about instruction in engineering and Lynn becomes more knowledgeable about engineering and its impact on instruction. Figures 1 and 2 show the ways in which our individual domains of knowledge have been transformed in different ways through this process of making explicit our border work. Note the major growth is

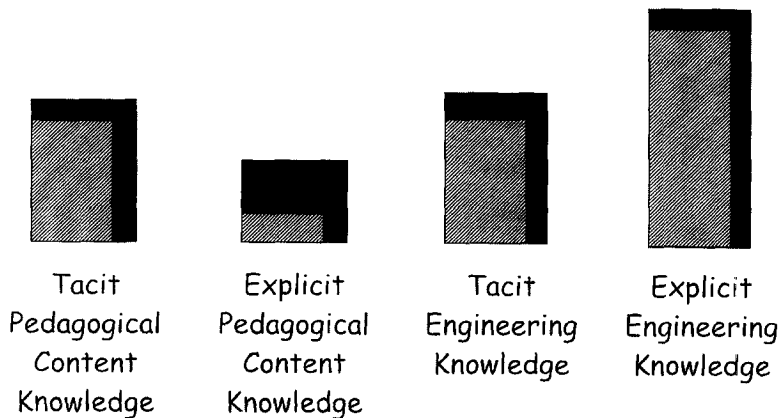


Figure 1 Ralph, before, cross-hatched areas, and after, solid areas, our work together. Note the substantial growth in Ralph's Explicit Pedagogical Content Knowledge arising as a result of our work.

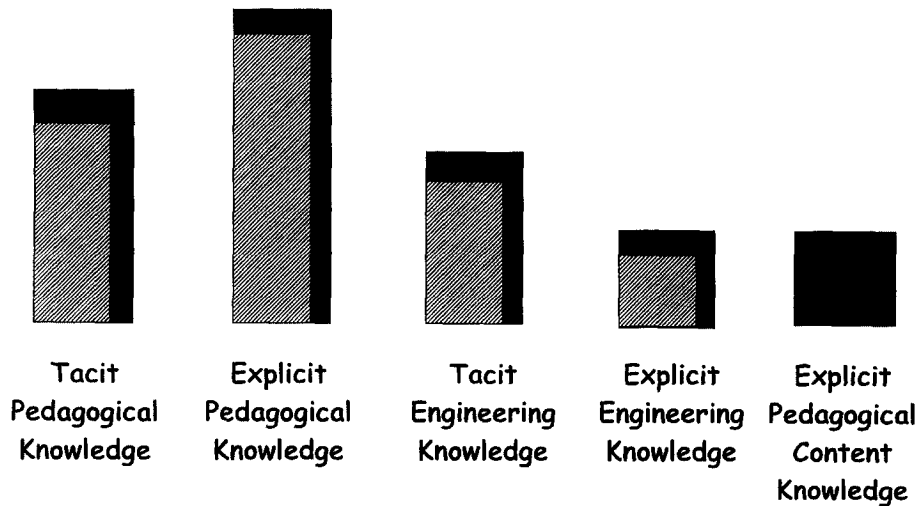


Figure 2 Lynn, before, cross-hatched areas, and after, solid areas, our work together. Note the creation of Lynn's Explicit Pedagogical Content Knowledge as a result of our work.

in Ralph's and Lynn's explicit pedagogical content knowledge of engineering, the area of our border work. Nevertheless, there is growth in all domains.

Using the metaphor: Seeing ourselves as border workers

By recognizing that we have both chosen to live and work in different cultures, and thus have different discourse and interaction patterns as well as different underlying perspectives, we have been able to see each other as cultural brokers (McAlpine, 1992). The task of the cultural broker is to become conversant with the perspectives and discourse patterns of the other culture, and to be able to explore and articulate explicitly the discontinuities between one's own and the other culture. The differences in cultures then become a constant, not something to be overcome, but something to be explored and celebrated. By recognizing the informative aspects of the discomfort of working in a cross cultural setting (Bateson, 1994), we use difference as a way to highlight and value the distinctness of our cultures. This discomfort can lead to enhanced reflection. We find ourselves asking: what is at the heart of our respective cultures – what is it we want others to understand? To value?! Here, we provide two examples of our cross-cultural or 'border' work and what we have learned from each other as we slowly

develop explicit pedagogical content knowledge in engineering. The scenarios are drawn from the course design and teaching workshop in Chile we did with engineering professors.

Scenario 1 – Ralph, working with engineering professors

Part of our 'Workshop on course design and teaching' involved getting the participants to reflect on the link between learning outcomes and instructional strategies. The form of activity I thought would be appropriate was a short piece of theatre in which I acted the 'mad professor' which at its most obvious level demonstrated a number of faux pas that real instructors should avoid. These examples of presentation skills are all too common and are amusing when exaggerated, for example, being outrageously casual with the audience, hopelessly incompetent with the overhead projector, excessively complex with explanation to the point where the class is obviously frustrated with the lack of sense, to name a few. I had originally used it in a first year tech writing course to relax students (the learning objective at that time). In all honesty I was not sure exactly what it was that had been happening, but I knew that it was good stuff, and with my ability to think on my feet I could get a message across. Before working with Lynn, my primary learning outcome was entertainment and relaxation of the group so that they could attend to the subsequent presentation

on learning outcomes and their link to instructional strategies.

Lynn questioned the use of this theatre wanting to know what (aside from humour) it could contribute to the learning of the participants in the workshop. This led us to explore various possibilities. Finally, in our collaboration, the 'theatre' was intentionally designed to be a role play to form the basis for a discussion about the link between learning outcomes and instructional strategies. It would be used as an example of an instructor teaching after not clearly specifying different learning outcomes and then designing instruction. Thus, with the addition of a discussion with the group about my purpose for selecting the theatre (a strategy suggested by Lynn based on her pedagogical knowledge), I was able to articulate and convey the more sophisticated learning outcome of designing instruction with a higher level learning outcome rather than the simple delivery of knowledge. After ensuring that the participants had the requisite knowledge and comprehension about the link between learning outcomes and instructional strategies, I was then able to facilitate the groups' application of this pedagogical knowledge to the design of their own courses (pedagogical content knowledge) which was one of the goals of the workshop.

The thing that really excited me was Lynn's analysis of the various aspects of the 'mad professor' that moved the experience away from a humorous interlude towards a much more explicit and focused learning endeavour. I was able to *re-engineer* the 'mad professor' for a new and valuable purpose. The learning for me was explicitly understanding the concept of learning outcomes and its link to instructional strategies via adopting Lynn's language representation of the concept. I understood explicitly that, in our collaboration, the theatre was designed to provide the stimulus for the discussion that was to follow. Based on their experience as students in the role play, the participants were able to explore the notion of the distance that one can go instructionally to promote learning objectives that lead to reflection on and analysis of concepts as opposed to simple reception of the concepts.

Scenario 2: Lynn, working with engineering professors

Another time we were introducing the participants to the idea of differentiating learning outcomes by

level, by the demand they put on students. I began by defining levels and then offering examples which given my lack of engineering knowledge needed to be very basic. My examples had to do with measurement, the only subject matter related in any way to engineering that I felt competent in explaining. For lower level learning outcomes, I gave the following illustrations: students would know that there are 100 centimetres in a metre and that the formula for perimeter of a rectangle is $2(L+W)$. For application, an illustration would be: students will be able to calculate the perimeter of a room. For evaluation, students will know under what circumstances it is appropriate to use the $P=2(L+W)$ formula.

The participants got the idea with these very basic illustrations, and then, quite naturally, wanted a more sophisticated set of examples. Of course, I could not provide it. Ralph stepped in and provided an illustration from thermodynamics. As an example of a lower level learning outcome, he provided the following: students will know what an exothermic reaction is and also that exothermic reactions are a source of heat. An instance of application would be: students will know which of the contents of the furnace (combustion of fuel being an exothermic reaction) can be oxidized to provide heat. For evaluation, students will know how to calculate the tradeoff that can be made between the oxidation of the charge and the use of an expensive fuel to minimize the cost of the process. Ralph successfully responded to the participants' need since thermodynamics is something that all these professors knew and had taught. His illustration enabled them to explore a central concept of learning in a useful and therefore meaningful subject matter context; they were formulating explicit pedagogical content knowledge.

As for me, besides learning more about thermodynamics, I realized how profound was my lack of knowledge about this other culture, engineering. I had never experienced quite so dramatically how empty was my pedagogical knowledge of subject matter connections since in my previous faculty development activities, professors from many disciplines participated, so the examples tended to be general. I realized that there was no way in which we could have been successful in the workshop without Ralph's explicit subject matter expertise and his growing explicit pedagogical content knowledge. It was this knowledge that enabled the participants to make clear links between the instructional ideas we were

presenting and how they might use them in their teaching. Together, we were providing them with the concepts and language they could use to create a discourse around teaching and learning.

Conclusion

Using the metaphors of culture and crossing borders we have been able to name some of the distinct features of what is involved in collaborative faculty development work. In this cross-cultural work, we have learned that we each have tacit and explicit knowledge in a number of domains that the other may not hold. What we are doing when we work together is creating or constructing a new and explicit language that is an integration of our varied knowledge domains. The result is a new language or discourse: explicit pedagogical content knowledge about engineering. Our awareness of our border work and the emphasis we put on

constructing explicit discourse is something we now highlight in working with professors. We emphasize the differing perspectives we bring and how the two together enhance the experience of learning for the professors . . . and of teaching for us.

For instance, the development of this explicit discourse has provided the means for Ralph to enhance the work that he has been doing in his department, faculty and discipline (see Figure 3). He finds increasingly that, by talking about developing an explicit language, colleagues become engaged and involved in teaching and learning conversations, and that this discourse is taken on by others in his department and faculty. As for Lynn, this enhanced understanding of the importance of developing a common explicit language spills over into the multidisciplinary aspects of her faculty development work. For instance, she has found it productive to encourage participants to explicitly define the discourse

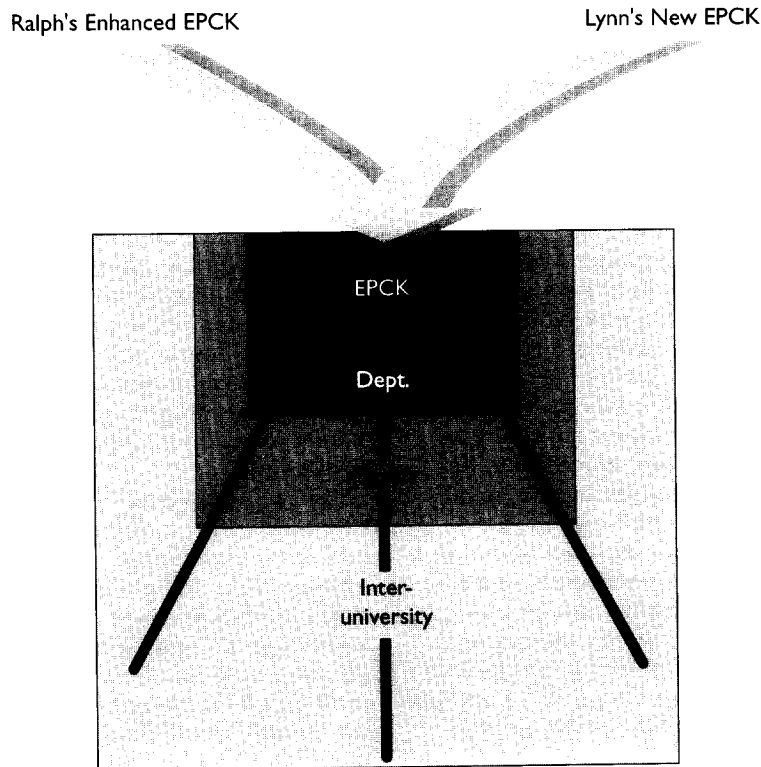


Figure 3 The EPCK that resulted from our work together not only facilitated our work together but facilitated our work with other members of our departments, our faculties and ultimately in our discipline. Ralph's publishing at the Canadian Conference of Engineering Education in Halifax, July, 1988, and at the CIM Conference of Metallurgists in the Symposium on Education are examples of the later.

around teaching and learning that they are using; in this way, the group (whatever their varied subject areas) begins to share a common language and understanding.

We see our co-instruction as very much a negotiated process – a two-way interaction in which each partner attempts to make explicit his/her perspectives, discourse and interaction patterns. The experiences of others will be different due to personality and previous history, but we believe the cultural metaphor can serve all by conceptualizing the relationship as a partnership of equals, and by providing the rationale for the construction of a new language.

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The authors

Lynn McAlpine, a faculty developer, has collaborated with professors interested in improving teaching in their own units in Canada, Indonesia and Chile.

Ralph Harris, an engineering professor, has been instrumental in his faculty in putting teaching on the agenda; he is also involved in university activities to further teaching development. Lynn and Ralph have worked collaboratively in Canada and Chile.

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