This final chapter synthesizes the findings and implications derived from applying the Decoding the Disciplines model across disciplines and within communities of practice. We make practical suggestions for teachers and researchers who wish to apply and extend this work.

Learning from Decoding across Disciplines and within Communities of Practice

Janice Miller-Young and Jennifer Boman

We suggested at the beginning of this issue that the "Decoding the Disciplines" model not only provides a framework for inquiry into teaching and learning disciplinary concepts, but also holds much potential for bridging thinking and teaching practice *across* disciplines. The chapters subsequently presented have extended the Decoding model in several ways, using it for epistemological and ontological bottlenecks. By analyzing interviews about seven bottlenecks from diverse disciplines, we uncovered common themes that illustrate experts' ways of thinking, practicing and being (Chapter 2, this issue). For example, these expert approaches required not only the ability to perform tasks such as deconstructing problems and recognizing patterns, but also the confidence to take agency in pursuing knowledge and to take time to explore different perspectives before coming to a decision. These ways of thinking, being, and practicing were employed even when thinking through concepts which our interviewees initially thought were relatively 'simple', cognitive bottlenecks. Also, by analyzing these interviews through different theoretical lenses, we have proposed several new lines of questioning for use in Decoding interviews (see below). Finally, by applying the Decoding interview within two different communities of practice we have shown how it can influence both teaching and curriculum. In all cases, we have been struck by the power of the Decoding interview in revealing basic assumptions about disciplinary thinking as well as the role it can play in developing the community and trust necessary for collaborative teaching and/or research projects.

Implications for teaching and curriculum

Use of the Decoding framework has much potential as a tool to help close the gap between expert and novice thinking. As Middendorf and Pace (2004) indicate, making disciplinary operations explicit and finding ways to model these can help move students towards mastery and success. We have suggested in this special issue that the benefits of Decoding can be realized both at an individual teacher level as well as across programs and curricula. We raise the following three implications for teaching and curriculum based on this work.

Teacher reflection. Looking at patterns in teachers' tacit thinking within and across disciplines can help provide a starting point for understanding one's own hidden assumptions and beliefs. The themes illustrated across this issue provide a number of specific ideas for teachers to reflect on - from common themes related to expert ways of thinking, practicing, and being (Miller-Young and Boman), or the role of lived experience and embodiment in one's practice (Currie), to deepening our understanding of how students experience our disciplines (Yeo).

In particular, the role of experience, which ultimately led to experts' confidence and seemingly intuitive ways of thinking, emerged as a strong theme across all chapters. Our findings highlighted the importance of instructors becoming more conscious of how their experience helped to develop their expertise, and for instructors to think more purposefully about how to support such learning experiences for our students. Articulating these reflections could help us to be more explicit about our own experiences with our students. As MacDonald (this issue) suggests, telling our own *stories* of learning and identity development may be another strategy to improve students' experience by reducing affective bottlenecks such as those which were strongly evident in the interviews with athletic therapy instructors (Yeo et al this issue).

The literature suggests that keeping journals, thinking deeply about our teaching, and considering feedback from students and colleagues are important ways for faculty to critically reflect on our ways of practicing and further, that reflecting on and sharing our own educational *stories* can help us understand what we bring to our work (Shadiow 2013). We suggest the Decoding interview could be added to this list of strategies. We found the Decoding interview, even when the interviewee is not involved in the research project, to be a powerful tool to help faculty become more conscious or, and thus able to critically reflect on, an aspect of their practice (Currie this issue; Haney 2015). In the words of Yeo (this issue), this kind of inquiry could open us up to being more generous with our students; to not only being focused on explaining concepts better, but being "focused on understanding the students better and how they are experiencing the discipline" (pp).

Supportive communities. While others have emphasized the importance of reflecting on one's own Decoding efforts within a supportive community (Middendorf and Shopkow in press), we have also shown how reflecting on *others'* interviews within a community of practice can challenge our assumptions and generate new insights. The service-learning (Chapter 6) and athletic therapy (Chapter 7) communities of practice both conducted collaborative self-studies in connection with Decoding, which seems to have played a powerful role in the impact of the interviews. As the service-learning group reported elsewhere, the Decoding interview itself can be important to the functioning of a collaborative learning community because it can help generate a climate of trust (Miller-Young et al. 2015) which is important when we are confronting the risks of learning and changing. Together, these findings suggest that Decoding has much potential for further use in professional development as well as research initiatives.

Curriculum development. Students need time to integrate the disciplinary knowledge they are learning with disciplinary ways of practicing and being. However, ways of thinking, practicing, and being are not often considered in curriculum planning. As we write in Chapter 2, "we might consider whether our teaching decontextualizes knowledge from the practices to which it relates, whether we prioritize content and 'efficiency of transmission' over deep understanding, and whether we focus on epistemology and narrow conceptions of knowledge at the expense of ontology… these themes could inform curriculum planning and related teaching and learning research in one's course, program, or discipline" (pp). As one example, the athletic therapy program has become more intentional about designing practical learning activities in lectures and tutorials rather than leaving students' experiential learning to chance exposures in clinical or practicum placements (Yeo et al.).

Implications for Decoding

While the scholarship of teaching and learning started with a focus on students' learning and learning processes (Kreber and Cranton 2000), the field has evolved to include a range of methodologies and epistemologies (Poole 2013; Miller-Young and Yeo 2015) and recognizes the need to address discipline-centered "ways of thinking, feeling, and behaving" (Coppola and Krajcik 2013, 628) as well as common goals such as critical thinking (Middendorf and Shopkow in press). There are several new ways Decoding could be used to address these topics.

Extending the model. While traditionally the focus of the Decoding interview has been on cognitive or procedural bottlenecks, our interviews with disciplinary experts also explored what could be considered epistemological and ontological bottlenecks (Miller-Young and Boman, this issue). In doing so, we also suggested new lines of questioning for Decoding interviews based on both our intuitive exploration and the use of different theoretical lenses. For

example, Currie (this issue) proposed the addition of sensory and experiential questions, Yeo (this issue) put forward questions about how experts interpret texts, their orientation to questions, and sense of play, while MacDonald (this issue) indicated how narrative identity theories might be used to help interviewers focus on uncovering and translating our disciplinary identities. It will be useful to further explore the utility of these lenses and questions in Decoding interviews, particularly for such non-cognitive bottlenecks, and to examine the impact of extending the interview in this manner for both the instructor and, ultimately, his or her students.

Decoding non-experts. While the premise behind the Decoding framework is to help make expert thinking visible, we have also explored Decoding of faculty members who were *not* experts on the bottleneck (i.e. reciprocity in service-learning) and discovered the utility of the Decoding interview, followed by critical reflection, to generate new learning and influence their teaching practice. This potential should be further explored for other contexts and participants. As one example, these findings suggest that conducting Decoding interviews with novices such as students throughout their development as learners in a discipline or program would also be a productive avenue to explore.

Future work

In this special issue, we have shown how Decoding is one tool to help us uncover and translate our disciplines, our experiences, and our ways of thinking, being, and practicing for our students. We have also suggested ways to extend this tool through theoretical lenses, new lines of questioning, and with communities of practice. As such, it will be important to intentionally inquire into the effectiveness of these suggested strategies in helping to uncover our disciplines for our students.

While this issue has largely focused on role of the Decoding interview, it is also valuable to consider the subsequent steps in the Decoding model, particularly how to use our learning from Decoding to improve how we give feedback to students and assess their learning. For example, the Athletic Therapy team is continuing their study by collecting longitudinal data from students as they progress through the revised program, while Rathburn and Lexier from the service-learning group are collecting data about students' understanding of service-learning, and will be able to compare similar data sets from before and after their Decoding self-study.

Teaching and learning are multifaceted phenomena, and knowledge is "in part a product of the activity, context, and culture in which it is developed and used" (Brown, Collins, and Duguid 1989, 32). With this in mind, we have identified several possibilities to further the use of Decoding in innovative and influential ways. We hope this issue, together with several other Decoding resources soon to be available (Middendorf and Shopkow in press, Pace in press), provides the resources and inspiration for others from diverse backgrounds to experiment with the framework in their own contexts in order to improve teaching and learning, build communities of practice, and contribute valuable scholarship that informs and transforms higher education.

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