Cognitive Apprenticeship in Online Teaching and Learning with Education Students

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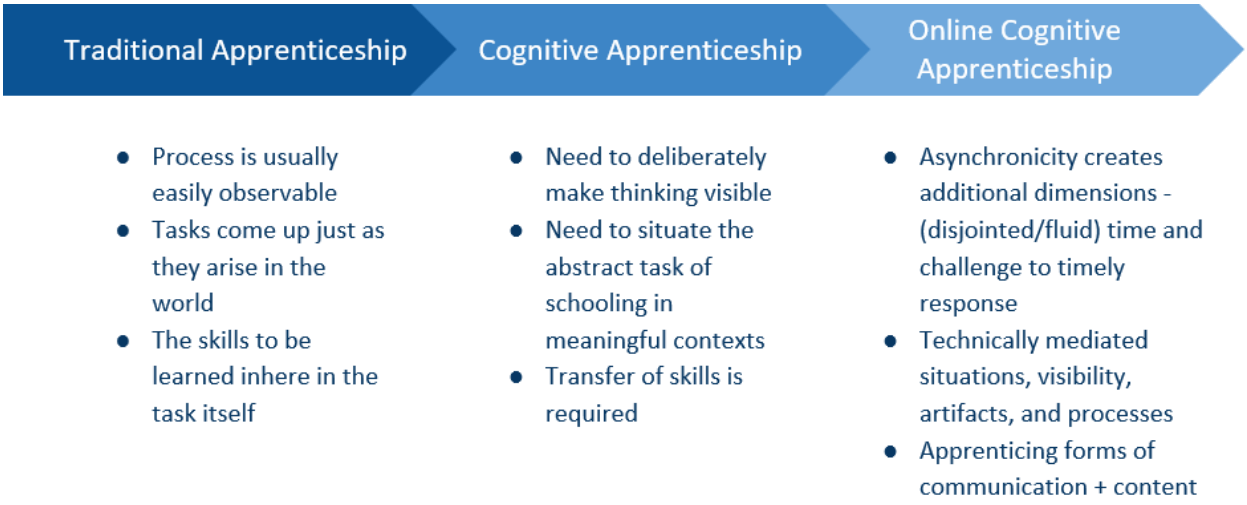
Cognitive apprenticeship (Collins et al., 1989, 1991) is a theory-based approach to teaching and learning that has served as a framework for designing learning experiences in a number of contexts, including K-12 and professional education in fields such as nursing, medicine, pharmacy, engineering, and teacher education. It is a pedagogy of *praxis* connecting the knowledge, skills, and ongoing reflection of discipline-based practitioners. Its practices also hold great potential for addressing what Openo (2020) calls online learning's three biggest challenges: interactivity, authenticity, and support. In this vignette, we extend the conceptualization of cognitive apprenticeship offered by Collins and colleagues into online teaching and learning and describe examples of online practices we have experienced with pre-service teachers and graduate students in educational leadership.

Conceptualizing Cognitive Apprenticeship

Concerned that the "practices" of the disciplines were being rendered invisible by "knowledge-telling" (Scardamalia & Bereiter, 1985) instruction in schools, Collins et al. (1989, 1991) conceptualized cognitive apprenticeship as a model of instruction that could make the reasoning and strategies of the disciplines more visible and accessible to students. They identified features of traditional apprenticeship as experienced in fields such as tailoring and cabinet making, then showed how tenets of apprenticeship could be adapted to the teaching and learning of cognitive skills and the requirements of disciplines such as reading, writing, and mathematics. These differences, plus additional features we've noted in online teaching and learning experiences, are summarized in Figure 1.

Figure 1

From Traditional to Online Cognitive Apprenticeship



Note. Information in the first two columns is from Collins et al., 1991.

Cognitive apprenticeship is understood through four interconnected dimensions of the learning environment: 1) *content*, which involves the different types of knowledge and strategies required for expertise; 2) *method*, which outlines teaching strategies to develop that expertise; 3) *sequence*, which structures and provides meaningfulness to learning activities; and 4) *sociology*, which focuses on the social organization of learning (Collins et al., 1989, 1991). The following examples we present in this vignette are organized around strategies of scaffolding, metacognition, and developing professional judgement and demonstrate the effectiveness of cognitive apprenticeship practices across these dimensions. Some examples draw on our practices that have transitioned from face-to-face to online teaching and learning and others using aspects of online environments to create new possibilities within the practices of cognitive apprenticeship.

Scaffolding through Collaborative Rehearsal

Scaffolding is a key instructional method for supporting and sequencing learning. Coordinated forms of scaffolding, clustered around the idea of *collaborative rehearsal*, can effectively support and propel learning as professional students develop new understandings and competencies through practice-based tasks. The following example highlights collaborative rehearsal practices we used in both face-to-face and online teaching.

An assignment in an educational leadership graduate course asks small groups of students to analyze a video of classroom practice to consider how ideas of knowledge and learning might be influencing the teaching and learning. This task simulates the experience of a school leader with an interest in understanding teaching and learning practices entering a classroom in the midst of instruction. It is also a complex undertaking as students must notice and consider multiple sources of information and the interactions among them.

One form of instructional scaffolding offers students an initial practice task with significantly reduced scope. We ask students to first examine a much shorter video segment or a series of three or four still images with prominent features consistent in their orientation to teaching and learning. Students are then guided to look for theoretical and practical nuances and contradictions within those same examples. A second form of scaffolding involves the instructor providing, or developing with students, a set of heuristic guidelines from the initial practice experience to take forward into the more complex and more independent completion of the assignment. Such guidelines might involve focusing on key moments within the overall classroom scenario, or identifying key words used by students and teachers and considering how they reflect the language of key theoretical stances. A third form of scaffolding moves students

from existing competencies toward new ones through the supportive presence of others. Students bring different professional experiences to their shared tasks, and work through cycles of analysis and feedback in which they model and mentor thinking for one another.

While the digital resources place our students outside the immediacy of their own classroom teaching and the task challenges them to look at teaching and learning through less familiar epistemological and leadership perspectives, students draw on their teaching experiences to question and understand key elements within the videos. The instructor guides the emergence of mastery as students articulate their thinking for one another and their existing expertise is situated as a resource for themselves and others.

Face-to-face and online, the use of digital learning resources and collaborative interaction engages students in a multimodal context of scaffolded analysis and reflection. Synchronous discussion environments and intentional movements between individual thinking and small and large group discussion support interactive and elaborative perception. With careful attention to the density of interaction and instructional intervention across time, we found asynchronous annotations of digital resources could support similar processes of scaffolding and collaborative rehearsal.

Metacognition through Digital Learning Artifacts

The timeliness of pedagogical response is a unique challenge in asynchronous elements of online learning such as discussion boards. While often active in individual discussion threads, instructors also seek to provide a synthesizing instructional presence for their classes. In a recent graduate course, a new opportunity to incorporate an aspect of cognitive apprenticeship arose when one student commented that hearing the instructor's weekly video synthesis of the content,

processes, and trajectories observed in the class's discussions helped them be more metacognitive about the course and their learning.

Metacognition is an important aspect of helping students bring to light the thinking and problem-solving practices of a professional field and (re)understanding learning and practice. Together with reflection, metacognition is another key instructional method within cognitive apprenticeship and one opened through online learning's ongoing production of digital artifacts.

Prompted by the student's comment, the instructor asked the class to structure their final discussion post for the course as one of four options, two of which provided ways for them to reflectively return to an example of their previous thinking. One option asked students to review answers to some questions they brought to the very first class. They were asked to reflect on how they would respond to the same questions now and how they might interpret their initial writing based on what they had learned during the course. Another option encouraged students to go back to a discussion board post from a previous week, and read/write back into it, to add, delete, or interweave new thoughts, or even to offer a dialogic response back to the previously posted ideas. Both options generated a great deal of reflection and metacognition, as well as evidence of new critical thinking in ways that could benefit both students and instructor.

The ability to see and respond to previous ideas from new perspectives, to mark and modify previous thinking, and to see previously unexplored possibilities in their earlier writing was a metacognitive experience enhanced by the features of the online learning environment. Engaging with the artifacts of their previous thinking and learning, students reflected on their developing skills, their ability to exercise judgement, and their developing sense of a scholarly and professional identity.

Developing Professional Judgement with Pre-Service Teachers' Work

The approach for cognitive apprenticeship is slightly different at the bachelor or entry level as students are still in the mechanical stages of foundational learning, metacognition, and meaning making from their own experiences. For example, students at the beginning of their Bachelor of Education program can be seen replicating practice until their first and second field experiences; exercising judgement is a pivot point for bachelor students. In line with the latter, arguably, the fading of instructor presence, as Collins et al. (1991) assert, occurs more towards the end of a term when students have curated knowledge and practiced within their field experiences. Additionally, scaffolding is malleable in that the needs of students, depending on their previous experiences and entry points to the learning, may be multidimensional. For example, there are multiple zones of proximal learning for learners, and instructors may employ scaffolding either adjacent to or intersecting the learning as a dynamic and changing process to support student success.

In keeping with the fading and scaffolding approaches for students at the start of their program, many instructors model good practice for preservice teachers through the way they have designed their course, chunked material, and delivered assessments. For students who have not engaged in a teaching field experience, instructors embed initial touch points for students to see how pedagogical practice may manifest (Meretsky & Woods, 2013). As such, theory to practice is a continuum depending on the experiences, 'success' in the field, and opportunities to unpack one's practices with field instructors, partner teachers, and within themselves as a means of metacognition (Collins et al., 1989). The richness of the learning experience is in part

relational to the ability for students to bridge their theoretical understandings derived from their class-based learning experiences and the 'practice' aspects as they engage in their practicum.

An example illuminating the application of cognitive apprenticeship for bachelor level students in education can be seen through the knowledge sharing and transfer from the core theoretically oriented courses and the manifestation in their field experience opportunities. The iterative process that students engage in while initially mechanically or replication based, whereby they apply lesson design and behavior management that is prescribed and modeled by their instructors shifts. This shift moves to a more independent and fluent approach which reflects again the ability to exercise judgement and independent thought from a preservice teacher lens. Students develop more independence and personalize their planning and facilitation of learning as instructors step back or even fade more to the background of the learning in order to support greater ownership and agency in the students. The essence of this approach provides rich practice for students as they move through the sequence of course work to practicum, to course work and then practicum in a two-year process.

Conclusion

We believe cognitive apprenticeship's orientation toward making the thinking practices of a discipline visible to students, toward making student thinking visible to instructors, and toward encouraging the development of professional and scholarly thinking is well suited to the social and productive possibilities of online environments. Our three examples from education for pre-service teachers and graduate students in educational leadership show elements of cognitive apprenticeship across its interconnected dimensions which include modeling, coaching, scaffolding, articulation, reflection, and exploration (Collins et al., 1991).

Scaffolding, as an instructional method, can support the development of specific concepts and processes of judgement. It can make visible heuristic strategies for accomplishing tasks, involve students in reflective articulation of their existing expertise, help sequence the complexity of their learning, and promote collaborative participation for a community of learners. We found the use of learning artifacts promotes reflection and metacognition, involves students in assessing their progress in learning content and strategies, and supports the development of their intrinsic motivation and exploration of new goals. The fading of instructor presence supports students as they transition between theoretical learning and the authenticity of field-based practice, whether online or face-to-face, and provides a through-line of practice between mentor and student-practitioner.

Professional education in online environments can use and continue to build on the authentic, interactive, and supportive pedagogical affordances of cognitive apprenticeship to enhance the quality of online learning. Ultimately, cognitive apprenticeships help students develop the skills and judgement belonging to their fields of practice.

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