

**Breaking it Down: Using a Content Representation Tool to Understand Preservice
Teachers Use of Pedagogical Content Knowledge**

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Introduction

Pedagogical content knowledge (PCK) addresses the intersection of what teachers know about teaching and content (Gess-Newsom, 2015; Shulman, 1986). According to Merriam and Bierema (2014), “the context itself shapes the learning” (p. 118), therefore addressing how to plan a lesson with appropriate teaching strategies and content should be thought of in a situational context (Grossman, Schoenfeld, & Lee, 2007; Stewart, Lambert, & Claflin, 2018). For preservice teachers, understanding the complexity of lesson planning or its impact on the practice of teaching is not carefully contemplated (Hammerness et al., 2005). According to Grossman et al. (2007), the teacher education curriculum needs to incorporate students’ understanding on content beyond basic pedagogy. The purpose of this study was to capture how student teachers think about breaking down content and make sense of student teacher understandings, using a content representation template during the first weeks of their student teaching experience.

Theoretical Framework

PCK in agricultural education has been studied with preservice teachers, student teachers, and experienced teachers, to uncover how PCK presents itself in agricultural educators (Rice & Kitchel, 2015; Stewart, Lambert, & Claflin, 2018). However, there is still more to understand about how PCK develops and how teachers learn to teach and plan for teaching. To better support our preservice teacher candidates during their teacher preparation program, we need to understand their development of PCK. One specific aspect of PCK is how teachers break down content for student understanding, often evidenced by lesson plans.

The Content Representation (CoRe) template is a data collection tool created from repeated attempts to capture science teacher’s PCK (Cooper, Loughran, & Berry, 2015). The CoRe template is designed as a table in which three important concepts for the lesson head the columns, and the first column contains prompts to guide thinking about each important concept including: What do you intend students to learn about this idea?, Why is it important to know this?, What else do you know about this idea that you do not intend the students to know yet?, What are some difficulties or limitations connected with teaching this idea?

Methodology

We employed a particularistic case study approach due the bounded focus on one specific seminar meeting with a group of individuals (Creswell, 2013; Merriam 2009). The case included 10 student teachers at Oregon State University during their first student teaching seminar, six weeks into their student teaching experience. The seminar focused on planning for teaching and was led by a faculty member, with assistance from a graduate student in the teacher education program and an undergraduate research assistant. During the first part of the seminar, teacher candidates were provided the CoRe template to use while brainstorming for a lesson on the parts

of the cell and as a group, we completed the first column (i.e. important concept #1). During the next part of the seminar, teacher candidates worked independently or in small groups to complete the remaining two columns (i.e. important concept #2 and #3). Following the activity, the , teacher candidates participated in a focus group about their thinking about lesson planning and the use of the CoRe template. The researchers approached data analysis as an inductive process by getting a sense of the data through reading, coding, and memoing based on the , teacher candidates' completed CoRe templates and our own field notes (Yin, 2009). After the initial data analysis and triangulation, researchers compared patterns to develop generalizations or themes (Creswell, 2013).

Findings

As we processed through the completed CoRe templates and our field notes, we began to recognize three themes emerging from the data: how students influence thinking about planning lessons, the importance of content knowledge and experience, and challenges to planning. For the first theme, the participants frequently mentioned how their own students influenced their thinking about planning lessons, making comments like, “they aren’t predictable,” and, “...important to see who the students are.” For the second theme, relating to the importance of content knowledge and experience, participants who shared their own learning experiences highlighted being inspired by prior teachers, even discussing particular lessons related to cells and how they helped develop schema to be able to think about this activity. The third theme, challenges to planning, focused on aspects of teaching and planning that were out of the control of these participants, such as circumstances relating to timing of the school calendar, the cooperating teacher, the school district, or the content standards.

Conclusions and Recommendations

While these participants seemed to have students at the forefront of their thinking about planning, we did not find conclusive evidence to assert they were furthering their development of PCK. Because PCK is the intersection of pedagogical and content knowledge (Shulman, 1986), requires knowledge bases related to content and pedagogy, and is developed over time (Cooper et al., 2015), it stands to reason these teacher candidates are likely deficient in one or several of the areas needed to demonstrate PCK (Gess-Newsome, 2015). More specifically, it is possible some of the participants did not understand the mistakes students might make or misunderstandings they may have (Grossman et al., 2007). Although, we were encouraged by how frequently participants' own students were discussed, leading us to believe the students are a major consideration in the planning for teaching.

We found value in the CoRe template and the case study (focus group) approach, both as tools to think about lesson planning, and as ways to capture thinking about PCK. Moving forward, we plan to utilize the CoRe template throughout the teacher preparation program to further understand how student teachers are attending to PCK to be able to provide additional scaffolds and support in their development as educators.

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