Arizona Agriculture Teacher's Mathematical Content Knowledge; A Pilot Study

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Introduction

Mathematics and science are both essential to the field of agriculture; however, while science curriculum is currently integrated in high school agricultural education classrooms, mathematics coverage is limited (Miller & Gliem, 1994; Stubbs & Myers, 2015). The opportunity for students to engage in real world application of mathematical content through agricultural education programs exists, but if agriculture teachers do not possess the content knowledge necessary to teach mathematics, students are then left at a disadvantage. Improving teachers' mathematical content knowledge will allow for students to have access to better STEM education opportunities, while increasing their likelihood to pursue degrees and careers within STEM focused fields.

Purpose & Objectives

Purpose:
Determine Arizona agriculture teacher's perceived and actual mathematical content knowledge.

Objectives:

1. To describe agriculture teachers' perceived mathematical content knowledge
2. To describe agriculture teachers' actual mathematical content knowledge
3. To describe the relationship between perceived and actual mathematical content knowledge of Arizona agriculture teachers.

Conceptual Framework

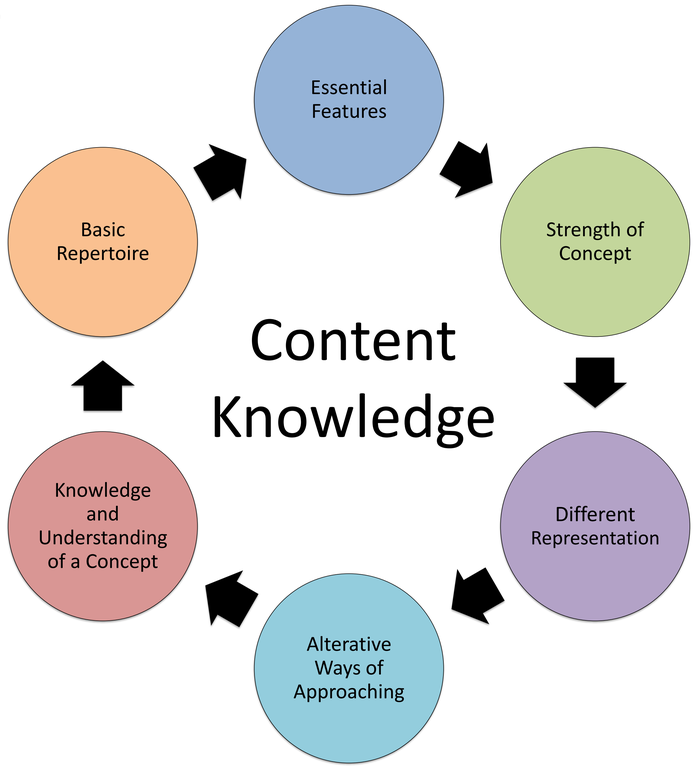
The Content Knowledge Framework was utilized in determining agriculture teacher's content knowledge for the subject area of mathematics. The framework was broke up into six individual areas; essential features, different representation, alternative ways of approaching, the strengths of the concepts, basic repertoire and knowledge and understanding of a concept (Even, 2008). Each one of these aspects help a teacher grow their personal content knowledge, allowing them to be more equip to answering students questions, provide examples and grow student knowledge.

Methodology

Procedures: Data were collected using a questionnaire that was sent out to Arizona agriculture teachers. The questionnaire was developed by the researcher.

Participants: 10 current Agricultural Education student teachers

Instrumentation: A Likert scale was utilized to determine perceived mathematical ability using the Arizona CTE Standards with mathematical connections. To determine actual content knowledge, procedural mathematical problems were given.



Implications

Findings la di da ag teachers should

Essential Features	I can explain the basic definition for this concept
Strength of Concept	I can identify subtopics related to this concept
Different Representations	I can describe multiple representations of this concept
Different Representations	I can connect multiple representations of the concept to one another
Alternative Ways of Approaching	I can choose the best approach to solve a problem related to this concept
Knowledge and Understanding of a Concept	I can use procedural knowledge to solve a problem related to this concept
Knowledge and Understanding of a Concept	I can link this concept to other concepts within and beyond the unit
Basic Repertoire	I can identify effective examples for teaching this concept

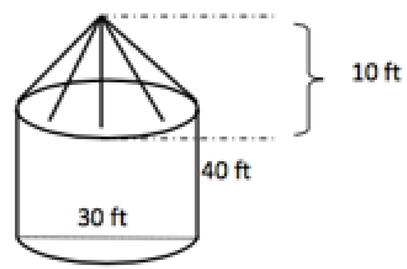
Content Knowledge Framework Components

Mathematics Ability Test Example (Stripling & Roberts, 2012)

Sarah purchases a farm. The figure below is a diagram of a grain bin that is on the farm Sarah purchased. Sarah would like to know the volume of the grain bin. Help Sarah determine the volume of the grain bin. The following are two formulas that may be helpful:

$$V_{cylinder} = \pi r^2 h$$

$$V_{cone} = 1/3\ \pi r^2 h$$



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