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**Using Self- Regulated eLearning for Teachers to Develop Mathematical Content**

**Knowledge in Fractions, Decimals and Percents.**

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## SELF REGULATED ELEARNING FOR TEACHERS

Using Self- Regulated eLearning for Teachers to Develop Mathematical Content Knowledge in Fractions, Decimals and Percents.

**Short Description:** Improving student achievement in mathematics is critical and inextricably dependent on teacher preparation and development in subject-matter content knowledge and pedagogy. Through an elearning intervention, development of content knowledge for teaching in mathematics can be ongoing, informal; self regulated, and can foster a learning community with parents for best practices in teaching mathematics for student achievement.

**Keywords:** elearning, professional development, self regulated learning, formal and informal learning, mathematical content knowledge, pedagogy, best practices, learning community

### **Problem Statement**

Wodka (2012) reported on Policymic, concerns about the shortage of STEM college graduates lead to a shortage of STEM workers for the U.S. workforce. Wodka (2012) states that the high attrition rate of STEM majors among college students is attributed to failing mathematics grades. Wodka argues that evidence suggests this in part is due to inadequate high school preparation (Wodka, M. (2012).

Salvin and Karweit (1985) stated that, “One of the most troublesome and enduring problems of mathematics is the accommodating heterogeneity in student preparation and learning rate” (p.351). Duan –Barnett and John (2012) discuss that the varying levels of math course outcomes are a concern for educators, researchers and policy makers. Recent efforts were made by the National Governors Association (NGA), the Council of Chief State School Officers (CCSSO) and the National Council of Teachers of Mathematics (NCTM), to enforce more

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consistent standards across the curriculum (p.4). Due to lack of standardization in curriculum and pedagogy, knowledge gaps exist that are detrimental to students' achievement. Colleges recognize that this gap exists and have implemented developmental math courses also known as remedial math courses as prerequisites to college mathematics.

Ball, Lebienski and Mewborn (2001), argue that the low levels of math achievement among American adults results from poor instruction in mathematics. They argue that formal schooling years in America are not producing the desired level of mathematical proficiency required by adults. The lack of proficiency in mathematics *includes* adults that work as professional educators. The insufficient understanding of mathematical knowledge and pedagogy leads to inadequate K-12 mathematics instruction. Developing teachers' mathematical content knowledge for teaching is central to improving mathematical proficiency of students and mathematics education as a whole.

National governmental organizations and policy makers attribute student achievement to teacher preparation. Programs such as, "No Child Left Behind", "Highly Qualified Teachers", and the most current "Race to the Top" all seek to address the issue of improving student achievement ([www.whitehouse.gov](http://www.whitehouse.gov)). The two foremost goals of race to top include: Implementing rigorous national academic standards that build college and career readiness. Attracting and keeping teachers by expanding effective support to teachers, evaluating teacher performance and rewarding effectiveness. Teacher effectiveness should impact student achievement.

### **ELearning for Developing Content Knowledge for Teaching**

On going professional development is one intervention designed to support the goals of the Race to the Top initiative for teacher performance. Professional development and continuing

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education should span a teacher's entire career. Professional development helps teachers develop the content knowledge and skills they need to succeed in their classrooms. By improving their skills and knowledge, teacher become better prepared to make the right curriculum and instructional decisions. As content and pedagogies change, teachers must continue develop over the course of their careers. Professional development takes on many forms: pre- service, in- service education, team collaboration, and peer review. "Online environments are rapidly expanding as a venue for professional development in education, business and industry," (Vrasidas and Glass, 2004). Online education allows for anytime, anywhere, flexible delivery of education. Online education fosters both formal and informal learning and builds communities of practice in content areas (Vrasidas and Glass, 2004). There is a need to support the ongoing development of mathematical content knowledge for teachers in an accessible, flexible and informal manner. Through self- regulated learning teachers can develop their knowledge and skills continuously. Self- regulated learning describes the process of taking control of and evaluating ones own learning and behavior. The main phases of self regulation involve planning, enacting and adapting. The online environment provides the just- in- time support for teachers to regulate their learning.

### **Purpose of the Study**

The purpose of the study is to implement and test a self- regulated professional development elearning intervention to develop teacher's mathematical content knowledge for teaching. The literature review provides the limitations of the research in developing mathematical content knowledge and pedagogy for both pre- service and in- service teachers. In addition the literature review reveals a lack of research on self- regulated, elearning as a professional development intervention for teachers.

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Furthermore the literature cites the need for education to fully integrate technology into learning. Current curricula across subject areas include the latest technology standards for education. Neiss (2005), argues that not only do teachers need to be subject experts, but that they need pedagogic content knowledge with the development of technology, otherwise known as Technological Pedagogical Content Knowledge. Due to the gaps that exist in the literature on developing mathematical content knowledge for teaching, this study seeks to address the following research questions:

- Does self- regulated elearning provide just- in- time support for development of mathematical content knowledge for teaching by providing flexible learning opportunities?
- How do elearning resources help teachers develop pedagogical and content knowledge for teaching Fractions, Decimals and Percents?
- How can the eMapps curriculum be used to support the development of mathematical content knowledge for teaching through self regulated learning?

### **Research Design**

1. Participants: K-8 Teachers
2. Context: A random sample of teachers will be invited to participate in an online unit of learning on fractions, decimals and percents with professional learning credit on completion. Participants will be provided with a log in to a website that houses the online program.

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3. Data Collection Procedures: Data will be collected from pre and post interviews, pre and post content tests, course products, discussion posts, reflections, tracking of course elements and adaptation's of self regulation cycles.

### **Preliminary Findings**

There is a deficit in current research on usefulness of self regulated elearning as a professional development tool. The proposed study will provide information on the value of elearning as a tool for developing mathematical content knowledge and give voice to the end users experience of the platform

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