

VoiceThread and iPad Apps Supporting Biological Change Concept

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EXECUTIVE SUMMARY

Kentucky science achievement data (KCCT, 2008-2011) for Biological Change indicated that middle grades students had little achievement compared to other concepts. The prior grade level for teaching this concept was fourth grade. A case study was designed to address the needs of three Fourth Grade classrooms. As part of No Child Left Behind (NCLB), language arts scores were supplemented with science and social studies. Objectives for the study were production of science and social studies curriculum using 3D instructional technologies for fourth grade in the following Kentucky Core Academic Standards (KCAS) Language Arts: Reading Standards for Informational Text K-5, Writing Standards K-5, Language Standards K-5, Range-Quality-and-Complexity of Student Reading; Core Content 4.1 Science Standard Biological Change; Core Content 4.1 Social Studies Standard Geography. Important findings for heterogeneous populations were made regarding the use of instructional technologies apps VoiceThread and Pangea Safari.

SETTING THE STAGE

In preparing research on science concept attainment for the National Science Foundation-Math Science Partnership (NSF-MSP) Start grant (2008-2010) and NSF-MSP Target Partnership (iSEEK, 2010-2014), it became apparent that middle grades teachers and specifically content in *Biological Change* needed further vertical content support. Students in middle grades showed the least amount of change in improvement with science concepts. One standard stood apart, *Biological Change*, because it had little achievement. Content area support, as of Spring 2011 from results of Kentucky Core Content Test (KCCT), continued to indicate need for support in learning and achievement. *Biological Change* involves learning about biological systems and the related geology and ecology. If middle grades were unsupported for achievement in *Biological Change*, the researchers wondered whether or not Elementary science also lacked support. Kentucky Core Academic Standards indicated that among Elementary grades, Fourth Grade addressed *Biological Change*.

Fall 2012 saw significant changes across Kentucky. NCLB testing was replaced in Elementary grades with Kentucky Performance Rating for Educational Progress (K-PREP) (KDE, 2012). Consistent with NCLB, science was specifically tested in Grades 4 and 7. The 2012-2013 academic year would serve as a baseline. This, of course, changed the focus of the unit from NCLB improvement to K-PREP criteria for baseline evaluation. Language arts components required Grade 5 to write with narrative and opinion stand-alone prompts as well as informative/ explanatory passage-based prompts. Science curriculum now contained 30% life sciences content and 20% geography (KDE, 2012). *Biological Change* was still important, but the degree to which it was measured had changed.

Also of concern to the researchers was the use of instructional technologies to support achievement for this curricular theme. 3D and iPad technologies hold great promise as an educational boost for learning and achievement with both heterogeneous and gifted and talented populations. Students who are considered Gifted or Talented may struggle to stay motivated in school due to lack of challenge or excitement, and the use of collaborative technology tools may give them the chance to obtain this (Crompton, 2013; Hubert & Ebner 2013; Zimlich, 2012). Renzulli (1995) found that independent study, mentorships, and electronic learning are top preferences for gifted learners. A curriculum unit addressing *Biological Change* was developed by Fourth Grade teachers in one Elementary school. Gifted and Talented students who were included in the general education classroom of each of the three Fourth Grade classrooms were able to use these apps during Biological Change instruction (Hur & Anderson 2013; Cumming, Rodriguez, & Strnadova, 2013). Within the three heterogeneous classrooms were approximately fifteen Gifted

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