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Yuejin Xu
Murray State University

George Patmor
Murray State University

Jamie Mills
University of Alabama

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Enhancing Teachers' Knowledge of Core Academic Standards through a Digital Content Development Workshop

Yuejin Xu, Murray State University, Murray, Kentucky
George Patmor, Murray State University, Murray, Kentucky
Jamie Mills, University of Alabama, Tuscaloosa, Alabama

Abstract

There is an immediate need to help classroom teachers understand the common core standards so they can more effectively teach the content to students of the digital generation. This study summarized the activities in a digital content development workshop for empowering teachers to develop standards-based digital content for K-8 students in need of accelerated learning. Using a pretest-posttest design, the study also examined the impact of the digital content development workshop on participating teachers' knowledge of core academic standards. A self-developed Knowledge of Core Academic Standards (KCAS) survey was used to measure teachers' recall of core academic standards, teachers' awareness of possible changes expected from the implementation of core academic standards, and teachers' understanding of the differences between the previous standards and the new core academic standards. Paired-samples t-tests were used to evaluate the mean differences before and after the KCAS survey in teachers' recall scores, teachers' awareness ratings, and the ratings of teachers' understanding of the differences. Findings indicated that participating teachers in the digital content development workshop gained significantly in the recall of core academic standards scores on the KCAS survey. Moreover, participating teachers also gained significantly in ratings of the awareness of possible changes and understanding of differences. The digital content development workshop offered a content-embedded pathway for enhancing teachers' knowledge of core academic standards. Limitations to the study are also discussed.

Keywords: Teacher professional development, digital content, common core standards
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The Need for Digital Content Development Workshop

The teaching profession is under much public scrutiny and criticism these days. In their Newsweek article, Thomas and Wingert (2010) described "the relative decline of American education at the elementary and high-school levels" and believed that the key to save American education is "the quality of the teacher" (p. 24). They further questioned why we cannot fire failing teachers. One widely-used indicator to identify failing teachers is students' standardized test scores. The Los Angeles Times used a value-added analysis to rank teachers --- Each teacher's performance is determined by how much he or she can help students progress in terms of test scores (Felch, Song, & Smith, 2010). The Los Angeles Times published

rankings of the effectiveness of more than 6000 third through fifth-grade teachers in the Los Angeles Unified School District in a searchable database, which has aroused controversies and debates. As educators, we can challenge Newsweek's position (Scherer, 2010) and Los Angeles Times' value-added models of teacher effectiveness (AERA, 2011). However, beyond challenging various outlooks on the issues involved, we need to attempt to relieve the public's concerns using a number of approaches. One such approach involves making teachers more aware of core content standards and how they can present the content to this digital generation.

Kentucky Senate Bill 1 (SB 1), enacted in 2009, was Kentucky's response to the growing national concern

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about education. It called for a revision of standards, the development of a new assessment system, and focused professional development (PD) for teachers across the state. Because of Senate Bill 1, Kentucky was one of the first states to adopt the common core standards (Common Core State Standards Initiative, 2010; Weston, 2010) and to implement them (Overturf, 2011). The core academic standards "represent considerable change from what states currently call for in their standards and in what they assess" (Porter, McMaken, Hwang, & Yang, 2011, p. 114). Consequently, there is an immediate need to help our teachers understand the common core standards, and know how to implement and translate the core academic standards into instructional best practices.

When implementing instructional practices, teachers need to consider the characteristics of the students they are serving. Today's students live, play and communicate in the "ever-increasing technology-driven world" (Hoffman, 2010). "Their mastery of the digitally written word far surpasses that of many adults" (Turner, 2010, p 42) and they have their own way of thinking. To harness this power, teachers need to be able to understand their digital learners and to know how to educate them appropriately (Jukes, McCain, & Kelly, 2008; Montgomery, 2007; Pletka, 2007).

One way to engage digital learners is to provide content in a format they are familiar with --- digital content (Bahr & Sudweeks, 2008; Shabajee, McBride, Steer, & Reynolds, 2006). Adobe Captivate ® is powerful software designed to enable anyone, even without formal programming skills, to create digital content. Its simplicity and value has been reported in several studies

(Hirca, 2009; Yelinek, Tarnowski, Hannon, & Oliver, 2008).

Workshop Activities

The digital content development workshop was a project funded by the Kentucky Council on Post-secondary Education (CPE) in 2011. Through intensive summer training (11 days) in July 2011 and online mentoring throughout the 2011-2012 school year (3 days), the digital content development workshop aimed to enhance elementary and middle school teachers' understanding of the new core academic standards in mathematics and language arts, to inspire participating teachers to design and implement best practice teaching strategies that meet the new core academic standards, and to assist participating teachers in transforming their best practice teaching strategies into digital content using Adobe Captivate ® software.

The summer training was led by a group of experts including two contracted staff from the Kentucky Department of Education (KDE). Beginning at 8:30 a.m. and concluding at 3:30 p.m., the 11-day summer training included two parts: core academic standards (day 1 to day 6) and Adobe Captivate ® training (day 7 to day 11). Activities included lecture, small group discussion, small group demonstration, and lab sessions. For lecture activities, participating teachers interacted with print materials and videos related to fixed vs. growth mindset, formative assessment, and Characteristics of Highly Effective Teaching and Learning (CHETL). Participating teachers also learned how to deconstruct core academic standards as well as how to build a standard-based unit in small groups. In the Adobe Captivate ®

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training lab sessions, participating teachers, under the guidance of the workshop instructor, learned to use Adobe Captivate ® software to transform their unit or lesson plan into student-oriented digital content. Specifically, participating teachers learned how to perform the following tasks using the Adobe Captivate ® software: creating demonstrations; using text captions and highlight boxes; adjusting the timing of the objects; creating assessment simulations; setting frame rates; creating text and graphic animation; integrating flash video and audio; using click boxes, buttons, and images; creating image slideshows; importing PowerPoint presentations into Adobe Captivate ®; creating quizzes, URL actions; and publishing digital content for the internet. During the last day of summer training, the teachers presented their self-designed unit, lesson plan, and Adobe Captivate ® project to the class. During the 2011-2012 school year, a 3-day mentoring component, offered online, provided continued support in helping teachers develop standards-based digital content in addition to fostering a learning community for participating teachers.

Teachers' Knowledge of Core Academic Standards

Classroom teachers are expected to "elevate the standards from mere words to tangible improvements in learning" (Griffith, 2011, p. 95). Teachers' knowledge of core academic standards should not only consist of recall or recognition of core academic standards relevant to their content area and grade level, but teachers should also understand the differences between previous standards and the new core academic standards, as well as be aware of possible instructional changes to better implement the core academic standards.

The objective of this study was to examine if the digital content development workshop had an effect on participating teachers' knowledge of core academic standards. Specifically, the study addressed three research questions:

1. Does the digital content development workshop affect teachers' recall of core academic standards relevant to their grade level and/or content area in which they teach?

2. Does the digital content development workshop affect teachers' awareness of possible changes in instruction as a result of the implementation of core academic standards?

3. Does the digital content development workshop affect teachers' understanding of differences between the previous standards and the new core academic standards?

Method

Participants. A total of 20 school teachers from 8 school districts in west Kentucky participated in this professional development workshop. Most of them were female (90%), white (100%) and 100% were in-service teachers. Seventy-five percent of them taught at the elementary school level while 25% taught at the middle school level. Many different content areas were served: 60% taught self-contained classroom (all subjects), 10% taught mathematics, 15% taught science, 5% taught English, language arts, and reading, 5% taught special education, and 5% taught arts and humanities.

Measures. An instrument was developed to measure teachers' knowledge of core academic standards. The Knowledge of Core Academic Standards (KCAS) survey contained five short open-ended questions. The first question asked the respondents to reproduce one standard from the core academic standards relevant to their grade level and/ or content area. Question 2 asked the respondents to explain the intent of the listed standard and question 3 asked the respondents to describe one possible artifact for the listed standard. Altogether, the three questions measured teachers' recall of a core academic standard. Written responses to the three questions were assigned 1 point if the response was correct, one-half point if partially correct, and 0 point if the response was incorrect.

The teachers' awareness of possible changes was measured by question 4 (How will the standard listed in question 1 change your instruction in the classroom?). Teachers' understanding of the differences between the previous standards and the new core academic standards was measured by question 5 (In your view, what are the differences between the previous standards and the new core academic standards in the grade level and/or content area in which you teach?). Written responses to question 4 and 5 were rated using a Likert-type scale with 1 standing for "no change articulated/ no difference recognized", 2 standing for "general change articulated/ some difference recognized", and 3 standing for "specific change articulated/ more difference recognized".

Procedures. This study employed a pretest-posttest design to evaluate teachers' understanding of core academic standards in language arts and mathematics. Teacher participants completed the KCAS survey before the start of the workshop. The KCAS survey was administered in the paper and pencil version and in a closed-book setting. All the participating teachers were able to complete the KCAS survey using less time than the given 40 minutes. They completed the KCAS survey for a second time at the end of the workshop in a similar setting. All participants' responses were typed into computer for scoring.

Three raters independently rated all twenty participants' pretest and posttest KCAS responses. Each rater was provided with a copy of the core academic standards and was given time to familiarize himself or herself with the standards. In addition, each rater used the same Likert-type scale and the same scoring procedures. All scores were entered into SPSS for data analyses.

Data Analysis. A measure of the reliability among three raters was calculated for the three constructs (recall of core academic standards, awareness of possible changes, and understanding of differences) in the KCAS survey using the Intraclass Correlation Coefficient (ICC). The modal score (or the score that occurred the most) among the three raters was selected to represent teachers' recall of core academic standards, awareness of possible changes, and understanding of differences. The following research questions were considered.

1. Does the digital content development workshop affect teachers' recall of core academic standards relevant to their grade level and/or content area in which they teach?

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A paired samples t-test was conducted to examine whether there was any mean difference between the pretest and posttest scores in teachers' recall of core academic standards.

2. Does the digital content development workshop affect teachers' awareness of possible changes in instruction as a result of the implementation of core academic standards?

A paired samples t-test was conducted to examine whether there was any mean difference between the pretest and posttest ratings in teachers' awareness of possible changes.

3. Does the digital content development workshop affect teachers' understanding of the differences between the previous standards and the new core academic standards?

A paired samples t-test was conducted to examine whether there was any mean difference between the pretest and posttest ratings in teachers' understanding of differences.

The assumptions for making inferences back to the population for the paired samples t-test are that the subjects are chosen randomly, that they are independent of one another, and that the difference scores are normally distributed in the population. Because teachers were selected from eight different school districts in west Kentucky, the assumption of independence would be met. In addition, a visual inspection of normal probability plots for the pre and post-test scores revealed that the assumption of normality was also tenable.

Results

Inter-rater Reliability. The intraclass correlation coefficients (ICC) of the ratings for the five questions in the pretest and posttest KCAS survey based on three raters are presented in Table 1. Often 0.70 is recommended as a minimum standard for reliability (Nunnally & Bernstein, 1994; Terwee et al., 2007). Most of the ICCs of the ratings for the five questions in the pretest and posttest KCAS survey based on three raters met this standard, indicating relative high inter-rater reliability.

Table 1. ICC and 95% Confidence Interval (CI) of the Ratings for the Five Questions in the KCAS Survey

	ICC	95% CI
Pretest*		
Question 1	0.794	0.443 - 0.921
Question 2	0.768	0.514 - 0.901
Question 3	0.556	0.069 - 0.810
Question 4	0.936	0.861 - 0.973
Question 5	0.888	0.766 - 0.952
Posttest*		
Question 1	0.774	0.524 - 0.904
Question 2	0.745	0.466 - 0.891
Question 3	0.821	0.627 - 0.923
Question 4	0.901	0.794 - 0.958
Question 5	0.859	0.706 - 0.939

Note. * $p < 0.05$ in the five questions in both pretest and posttest.

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A paired-samples t-test was used to evaluate the mean differences before and after the survey for the three research questions posed in this study. For research question 1, the means and standard deviations of participating teachers' recall of core academic standards scores for the pretest and posttest are reported in Table 2. The results revealed a statistically significant difference between the mean of the pretest recall score ($M = 1.775$, $SD = 0.769$) and the mean of the posttest recall score ($M = 2.35$, $SD = 0.745$), $t(19) = 3.035$, $p < 0.05$. The standardized effect size of d = 0.68 indicated a medium effect. The 95% confidence interval for the difference in the pre-test and post-test means for teachers participating in the workshop was 0.18 to 0.97.

Table 2. Means and Standard Deviations of Teachers' Recall of Core Academic Standards Scores in Pretest and Posttest KCAS survey

	M	SD	n
Pretest	1.775	0.769	20
Posttest	2.35	0.745	20

Note. $t(19) = 3.035$, $p < 0.05$

For research question 2, the means and standard deviations of ratings of participating teachers' awareness of possible changes for the pretest and posttest are reported in Table 3. The results revealed a statistically significant difference between the mean of the pretest awareness rating ($M = 1.75$, $SD = 0.55$) and the mean of the posttest awareness rating ($M = 2.25$, $SD = 0.55$), $t(19) = 3.249$, $p < 0.05$. The standardized effect size d = 0.73 indicated a medium effect. The 95% confidence interval for the difference in the pre-test and post-test means for teachers participating in the workshop was 0.18 to 0.82.

For research question 3, the means and standard deviations of ratings of participating teachers' understanding of differences for the pretest and posttest are reported in Table 4. The results revealed a statistically significant difference between the mean of the pretest rating in teachers' understanding of differences ($M = 1.85$, $SD = 0.49$) and the mean of the posttest rating in teachers' understanding of differences ($M = 2.10$, $SD = 0.55$), $t(19) = 2.517$, $p < 0.05$. The standardized effect size d = 0.56 indicated a medium effect. The 95% confidence interval for the difference in the pre-test and post-test means for teachers participating in the workshop was 0.04 to 0.46.

Table 3. Means and Standard Deviations of Ratings of Teachers' Awareness of Possible Changes in Pretest and Posttest KCAS Survey

	M	SD	n
Pretest	1.75	0.55	20
Posttest	2.25	0.55	20

Note. $t(19) = 3.249$, $p < 0.05$

Table 4. Means and Standard Deviations of Ratings of Teachers' Understanding of Differences in Pretest and Posttest KCAS Survey

	M	SD	N
Pretest	1.85	0.489	20
Posttest	2.10	0.553	20

Note. $t(19) = 2.517$, $p < 0.05$

Discussion

Digital Content Development Workshop and Teachers' Content Knowledge. This study evaluated the effect of the digital content development workshop on teachers' knowledge of core academic standards. Findings from paired-samples t-tests of pretest and posttest KCAS survey ratings indicated that participating teachers in the digital content development workshop scored significantly higher in the recall of core academic standards items on the KCAS survey on the posttest than on the pretest. Moreover, participating teachers also gained significantly in ratings of the awareness of possible changes and understanding of differences. Specifically, the digital content development workshop may have helped participating teachers become more aware of the instructional changes expected from the implementation of core academic standards and better understand the differences between the previous standards and the new core academic standards.

In their study of teacher content knowledge, Moyer-Packenham and Westenskow (2012) identified two pathways for promoting teacher content knowledge growth, namely, content explicit and content embedded. They also recommended a "shift in teacher professional development activities from content-explicit to content-embedded pathways" (Moyer-Packenham & Westenskow , 2012, p. 145). The digital content development workshop in the current study mainly followed the content embedded pathway, whereby the goal of growth of teachers' knowledge of core academic standards was embedded in the development of standards-based digital content.

Measuring Teachers' Knowledge of Core Academic Standards. Following the release and state-adoption of the common core standards, there are now two U.S. Department of Education funded consortia to develop assessments aligned with the common core standards (Porter, McMaken, Hwang, and Yang, 2011). However, few instruments for evaluating teachers' knowledge of core academic standards were available at the time of the digital content development workshop. The KCAS survey is our attempt to address this need. The open-ended explanation-type of questions was used to accommodate the participating teachers of different grade levels/ content areas. Our findings from the intraclass correlation coefficient analyses indicated a relatively strong reliability of the KCAS survey.

Limitations

A limitation to the present study was that a control group was not obtained. A control group with random assignment would better determine the effect of the digital content development workshop on teachers' knowledge of core academic standards. Moreover, it needs to be pointed out that scoring the

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KCAS survey was also time-consuming. In terms of future studies, an objective test of the knowledge of the core academic standards designed specifically for each grade level and/or content area, in addition to open-ended written items would be helpful to many school
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districts in the evaluation of the construct of teachers' knowledge of core academic standards. Thus, given the limitations of this study, future research should focus in the aforementioned areas as well as to confirm the findings of the present study.

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Yuejin Xu is Assistant Professor, College of Education, Murray State University, Murray, Kentucky

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George Patmor is Live Text Coordinator, College of Education, Murray State University, Murray, Kentucky

Jamie Mills is Associate Professor, College of Education, University of Alabama, Tuscaloosa, Alabama