Success in High-Need Schools Journal
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Theme: "Implementing Illinois Common Core Standards in Teacher Preparation and Professional Development"

Introduction

Arguably the most important of the national educational reforms of the past decade, the Common Core Standards Initiative (CCSS) provided a national blueprint for states to establish twenty-first century curricular benchmarks for K-12 student achievement. The goal is to improve preparation of students for success in college and careers in an increasingly demanding and competitive global economy. Illinois adopted the national standards in 2010, one of forty-five states and the District of Columbia to adopt the CCSS to date.

Implementation of the high standards articulated in the 2010 Illinois Common Core State Standards is a major challenge facing teacher preparation and professional development programs. This issue of the ACI online journal *Success in High-Need Schools* focuses on ACI member standards implementation projects is areas such as language arts and mathematics, especially directed to improve student achievement in high-need schools. The issue includes a case study of standards implementation in the State of Maine, offering a basis for comparison with the activities in Illinois. These undertakings have been designed to align evidence-based practices with the Common Core standards to promote effective instruction and teacher professional growth.

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Publisher's Column, *by Jan Fitzsimmons, Ph.D.*

The Common Core Standards Initiative

Multiple education reform initiatives are being implemented across America as policy makers and practitioners strive to meet the needs of students today and prepare them to succeed in "college and careers." These reforms will have a significant impact on students and teachers. Arguably, the one which will have the broadest reach and deepest influence is the Common Core Standards Initiative (CCSS). Forty-five states, the District of Columbia, four territories, and the Department of Defense Education Schools have adopted the CCSS to date. The CCSS represent a move to a national curriculum that embraces internationally benchmarked knowledge and skills for the twenty-first century.

Illinois adopted the CCSS as the Illinois State Learning Standards Incorporating the Common Core in Math and English Language Arts in 2010. The standards are a move toward fewer and clearer standards and emphasize students' need to acquire deeper conceptual understandings; i.e., they represent a radical departure from curriculum that is "a mile wide and an inch deep!" The goal is to better prepare students for success in college and the workforce in an increasingly demanding and competitive global economy. The standards were developed through a backwards design process that first looked at what it means to be college and career ready and then identified benchmarks for students to attain during their time in school. As a result, 2010 state standards provide benchmarks for knowledge and skills that students should have at the end of each grade level.

In Illinois, assessments for the new standards will be in place for the 2014-2015 school year, though this year's state achievement tests have incorporated items written to the CCSS in about 20% of the questions in reading and math. In its final stage the Illinois CCSS assessment will be computer-based and consist of two summative components and two interim components. Making them performance-based is a major innovation in the new assessments. The English language arts assessment will focus on writing effectively when analyzing texts. The mathematics assessment will focus on applying skills, concepts, and understandings to solve multi-step problems.

The launch of such an initiative in Illinois and across the nation was a vast undertaking whose success required many levels of knowing and understanding from the current teachers, administrators, and students and their parents in our schools, to the teacher and leader educators who work with schools and the new corps of teachers and leaders they are preparing for future classrooms and schools. This issue of *Success in High-Need Schools Journal* focuses on the many stages of CCSS implementation at a variety of levels that are necessary for success and includes these articles and columns:

Hines, McGee, McMahon et al write about *Realizing the Common Core* in their article on integrating the mathematics common core practices and standards into instruction in sixth through twelfth grade in more than ten high-need school classrooms across Illinois. The group asks, "How do you design and integrate content, pedagogy and assessment in an innovative manner that results in sustained, improved mathematics achievement?" They find their answer in a focus on the Common Core "Practices"—the big ideas that underlie the standards-collaboration, authentic P-20 partnership, and action research in the K-12 classroom. The authors also share sample lessons and their impact on students all organized around the eight critical Common Core Practices in Mathematics. **Tonsing-Meyer** provides a case study of implementation of the mathematics CCSS at one institution within the ACI Math Learning Collaborative Network. She concluded that high-quality, needs-based professional development substantially increased the knowledge and skills of the sixth and seventh grade teachers participating in the project.

Loomis and McCune highlight the importance of partnership between schools and institutions of higher education in implementing the CCSS and improving instruction for all students. In their article, *The Perplexing Challenge of Transitioning to the Illinois Common Core Standards*, Loomis and McCune discuss the serious gap in educational attainment in Illinois that will be exacerbated when the CCSS is fully implemented. They describe how they have accessed resources from a variety of sources to partner and collaborate with K-12 schools and other colleges and universities to strengthen their program, the teachers and leaders they develop and thus the students in multiple classrooms. These authors offer additional insights into the needs of students in special education in the CCSS initiative.

Laura Beltchenko's column, *New Years "Intentions,"* cuts to the heart of the matter for practitioners---How do I implement the English Language Arts (ELA) Common Core Standards? From a CCSS reference point, what do I need to know, understand and be able to do to best instruct my students? Beltchenko describes a step-by step process for gaining understanding of the ELA CCSS to inform practice using a scientific method framework. Citing helpful resources, Beltchenko's comments provide guideline for launching the ELA CCSS in the classroom.

Rebecca Nelson's column, *The 'Alphabet Soup' of Program Re-Design* describes one university's teacher and leader preparation redesign that addressed not only the launch of CCSS, but a myriad of educational reforms that, like CCSS, impact teacher and leader preparation centered on the success of each K-12 student in education. Nelson asserts that although the process of program redesign is fraught with challenges, it is an exciting time for professional dialogue--that through rigorous, professional dialogue great teachers and leaders come to prepare great students who will change the world!

Finally, **Overall and Ward** bring a case study from the state of Maine in discussing the integration of Maine's CCSS in pre-service teacher preparation in a practicum block program. They make the case for the importance of integrating technology into teacher preparation to create effective learning communities and authentic learning. While standards-based instruction is an important component of preparation, these authors chronicle the importance of how candidates learn to be 21st century teachers by highlighting the role that technology plays!

Conclusions

Launching a national curriculum reform movement requires authentic partnership and collaboration among multiple layers of educators to be effective. Though on the surface, CCSS appears to be primarily a K-12 curriculum initiative, it is truly a P-20 matter of instruction and assessment as well as curriculum reform. What are the opportunities for collaboration? How can partnerships collaborate to improve educational experiences that integrate the CCSS with instruction? What will the impact of this massive reform movement be? The articles and columns in this issue of *Success in High-Need Schools* begin to address a few of these critical questions.

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Realizing the Common Core: Integrating the Math Common Core Practices and Standards into Instruction, *by Ellen Hines, Ed.D., Max McGee, Ph.D., Mary McMahon, Todd Oberg, Ph.D., Julie Tonsing-Meyer, Ed.D., Jan Fitzsimmons, Ph.D., and the MLCN Teachers*

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The MLCN Teachers represent an extraordinary corps of 6^{th}-12^{th} grade mathematics teachers whose daily mission is to improve learning for each child. They embrace change and innovation and are committed to closing the achievement gap by integrating the Common Core Mathematics Practices and Standards into their instruction.

Abstract
The Math Learning Collaborative Network (MLCN) is an Associated College of Illinois (ACI) *Center for Success in High-Need Schools* project created to deliver a rigorous two-week professional development experience with ongoing support for 40 mathematics teachers from high-need schools serving students in grades 6-12 from three regions in Illinois. Focusing on the Common Core State Standards for Mathematical Practice (CCSSMP), the MLCN design integrates content, pedagogy, assessment and action research in an innovative manner that is resulting in sustained, improved mathematics achievement. The MLCN consists of five partnering entities that create a collective statewide professional learning community (PLC) as well as smaller regional PLCs. This report on MLCN activities to date grew out of an online colloquium MCLN participants held on September 29, 2012, to assess project findings and results.

Introduction
The Math Learning Collaborative Network (MLCN) includes: 1) three institutions of higher education (IHEs)-North Central College, Illinois College, and McKendree University that provide expertise in mathematics and science, as well as best practices in educational pedagogy; 2) the Associated Colleges of Illinois *Center for Success in High-Need Schools* (ACI Center) which convenes authentic partnerships throughout Illinois to improve teaching and learning in high-need schools; 3) faculty and administrators from public school districts that are serving high-need middle school and high school students within the following three regions: Belleville School District 118, East Aurora School District 131 and Jacksonville School District 117; 4) partners from business and industry within the regions which require their employee's use of advanced mathematics topics including Gallus BioPharmaceuticals, Starhill Forest Arboretum and Primera Chicago, and 5) consulting partner, the Illinois Math and Science Academy (IMSA), with expertise in all areas of education in science, technology, engineering, and mathematics (STEM), particularly in technology.

The partners developed three regional collaboratives that together form a statewide network centered around the partnering school districts' needs. Through summer workshops and teaching support sessions during the school year, teachers received instruction in the common core practices and standards, instruction in mathematical content that centered on algebraic and geometric thinking, training and practice in problem-based learning and inquiry driven pedagogy, and assistance and support in developing student performance assessments and data collection and analysis for action research.

The goal of MLCN, in alignment with the Illinois Mathematics and Science Partnership, is to advance 6-12 grade teaching and learning in math by producing a robust corps of secondary 6-12 grade teachers who have the content knowledge, as well as the pedagogical skills and grasp of their use in industry, to understand, implement and integrate rigorous mathematics concepts and skills, common core standards, problem-based inquiry instruction and other evidence-based practices that will in turn build students' knowledge and skills while inspiring and motivating them to persist in their STEM studies.

Recently, there has been a sense of urgency to increase the number of STEM graduates in the United States, including the number of minority STEM graduates (Kendricks & Arment, 2011). Our intention is that MLCN-trained teachers will influence minority and low-income boys and girls to achieve in STEM and thus persist in studying STEM in high school and college, ultimately, to increase the number of minority and low-income individuals entering STEM professions. In a recent comparison American students ranked 35 out of 40 countries in math and 29th out of 40 in science (Cleaver, 2011). Simultaneously, this collaboration will: 1) Improve STEM learning for in-service teachers through rigorous professional development and inspire their commitment to STEM through participation in action research that engages them in a professional endeavor and demonstrates their impact on 6-12 grade student learning, and; 2) Create an authentic P-20 collaboration that serves the network and is a systemic feedback loop for ongoing development of STEM teacher preparation.

The instructional emphasis in this project is on concept development and skill proficiency. The Standards for Mathematical Practice described in Common Core State Standards (CCSS), include students' attention to the use of appropriate strategic tools in problem solving, including electronic tools, and the ability to reason abstractly and quantitatively, including the flexibility to move between contextualization and decontextualization of mathematics problems as needed in the reasoning process. A problem-solving approach incorporating appropriate instructional technology is valued for the engagement of students in authentic, useful, and motivated learning (NCTM, 2000). Inquiry-based instruction promotes a scientific approach to understanding and reasoning about complex relationships that are present in a problem-solving environment (Bransford, Brown & Cocking, 1999; Resnick & Nelson-LeGall, 1997). As a whole, the project creates problem-solving environments that invite inquiry to promote knowledge of underlying concepts, both for teachers and for their students.

Teachers in the MLCN conducted action research to look at the impact of instruction they designed to address the eight common core practices that frame the Common Core Mathematics Standards. The model for their research projects was:

- Identify a focus
- Collect data
- Analyze the data, and
- Reflect

Mathematics Common Core Practices

The common core practices create learning environments and supportive mathematics practices that foster achievement and deep mathematical understanding for all students. The eight common core practices include:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Each common core practice is discussed briefly and a sample of subsequent action research and response to the action research built around each practice is shared. Many of the examples encompass more than one Common Core Recommended Practice, but we have placed them with the recommended practices we find most closely aligned.

<u>CCSS Recommended Practice 1: *Make sense of problems and persevering in solving them*</u>

The Common Core Standards documents note that to make sense of a problem, "students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary." In other words, when faced with a challenging problem, students should not simply look for key words or symbols or attempt to retrieve a formula or rule from memory. Instead, they should think about what the problem means, what information is needed to solve it and what similar, simplified problems could help them solve the more challenging one. They should seek first to understand the question before reaching for a quick answer.

As for perseverance, the Third International Mathematics and Science Study (TIMMS) data have shown that American students tend to spend less time trying to solve problems than their peers in countries that outperform America. With the plethora of timed, standardized tests our students face throughout their educational careers, it is no wonder that they often race to finish without giving each item appropriate attention and thought. Perseverance in problem solving is essential for students to tackle challenging problems, and our goal is to help students build the capability, confidence and resilience to think deeply about tasks rather than rush to complete them or quickly seek simple solutions.

The following example illustrates instruction that implements the Common Core Recommended Practice of making sense of problems and persevering in solving them**.** One MLCN participant developed an activity-based lesson that she used with her freshmen students enrolled in Principles of Algebra and Geometry. In the lesson, she engaged her students with physical models of fractions using circular fraction pieces. Later the students completed related activities using electronically-generated illustrations in the computer lab. Some of the questions she asked her students to consider were the following:

> How many posters can you paint with 1 can of paint if one poster takes _____ cans of paint?
>
> Jack has 1 box of pancake mix. He used _____ of it to make breakfast. How much of the pancake mix did Jack use?

On an initial reading, these problems may sound as if they have the same answer. They do not! To promote number sense, the teacher consistently asked her students to estimate their answers to these problems before actually finding the answers. She also asked them to explain their solutions to the problems and why their solutions were reasonable. Her carefully chosen examples guided them to an understanding of why the problems would not have the same solution.

<u>CCSS Recommended Practice 2: *Reason Abstractly and Quantitatively*</u>
Among the eight Common Core Recommended Mathematical Practices, the importance of reasoning abstractly and quantitatively cannot be overemphasized as an essential feature in the pathway to advanced mathematical thinking. The compelling importance of reasoning has been highlighted in two noteworthy publications that appeared prior to the emergence of CCSS and that provide support for the value of instruction that encourages reasoning. These are *Principles and Standards for School Mathematics* (National Council of Teachers of Mathematics, 2000) and *Adding it Up* (National Research Council, 2001).

Instruction focused on abstract and quantitative reasoning requires that students understand quantities based on whole numbers, fractions, negative numbers and other rational numbers that they encounter in middle school which form the background for understanding irrational and imaginary numbers to be encountered in high school. For example, when a student attempts to understand why the product of 3 and -2 is -6, it may be helpful to think about the outdoor temperature dropping 2degrees each hour for three hours. The resulting temperature will be down 6 degrees from where it was three hours earlier.

Perhaps more importantly, students must also become adept at recognizing and using the relationships among numbers in problem solving situations. Reasoning is an essential tool in recognizing numeric relationships and in developing problem solving proficiency. Reasoning may involve the process of abstraction in which students focus on the underlying mathematics relationships in real world problem situations without distraction from the nonessential and perhaps nonmathematical features of the situations. Authors of the CCSS Mathematical Practices describe a process of *decontextualization*, through which students separate their thinking from the context of a problem, to focus on underlying mathematics relationships. Through decontextualization, students learn mathematics from a problem that will be applicable in other math problem solving situations. The authors also describe the process of *contextualization*, through which students, once they have reasoned an answer to a mathematical problem, turn back to the context of the problem to make sure that the reasoning and answer fit with the contextual constraints of the particular situation. Together, the processes of decontextualization and contextualization enable students to abstract essential mathematics from a problem solving situation and to apply it in new and unfamiliar problem solving situations.

Several project participants reported on situations requiring students to reason numerically and abstractly in their action research projects. One participant helped her students grasp requirements of the order-of-operation rules by encouraging them to move back and forth between contextualized real-world situations and formal abstracted algebraic symbolism. Several others engaged students in activities such as estimating fractions to develop number sense, making sense of multiplication by the reciprocal as an interpretation of fraction division, and exploring what it means to square and cube a number.

In many classes, hands-on activities using manipulatives and educational technology such as iPads and interactive white boards aided in the instruction of students. Students were asked to use evidence to back up their reasoning and problem solving. Participants commented that since math in the real world does not present itself as a simple problem, it was necessary to incorporate more problem solving and real world functionality of expressions and equations in the classroom.

CCSS Recommended Practice 3: *Construct viable arguments and critique the reasoning of others*

The focus of this recommended practice is that students should think and act like young mathematicians whenever they are solving problems or exploring new ideas, i.e., they should be able to provide logical, reasonable arguments and justifications for their work. It is not acceptable for a student to simply provide an answer or response; they need to understand that their work is not finished until they can provide an explanation supporting why their answer or solution is correct. Such a justification uses mathematical definitions and previously established results (theorems), along with appropriate representations, to form a logical sequence of statements that not only explains why the result is correct, but also clarifies how the ideas used are related to each other. In addition, students should expect to be questioned about their results not only by their teachers, but their fellow students as well, and thus learn to be ready to respond to any challenges with appropriate responses. Furthermore, students need to be able to examine and compare different arguments with an eye to determining if an argument is valid and logically correct or if there is a flaw in it. If there is a flaw in the argument, students need to be able to identify where it is, provide a counter example to show the error, and help in correcting the argument. In this way students begin to see that the role of arguments and proofs in mathematics is a form of discourse or communication between people doing and learning mathematics.

This standard was very evident in one participant's lesson on understanding operations with fractions. With each problem presented, students were required to explain how they arrived at their solution and why they felt their answers were reasonable. Students were required to show their solutions using concrete models. When a question from a student arose, the teacher directed another student to explain how the solution was determined.
Also, another teacher used a technique called "My Favorite No" for review (https://www.teachingchannel.org/videos/class-warm-up-routine). Using this instructional technique, a teacher selects an example of student work that, while incorrect, contains a kernel of the correct concept or procedure. She asks students to analyze the work and explain why part of it is correct. Through this process, students learn to analyze their mistakes, recognizing the correct parts of the problem and where their errors were made.

<u>CCSS Recommended Practice 4: *Model with mathematics*</u>
A mathematical model is a mathematical structure that approximates key features of a situation or phenomenon with an eye toward capturing many of the properties of the original, real-world mathematical problem. The model created can be manipulated and studied using mathematical tools in order to better understand the original situation and arrive at a solution that best fits the problem situation. The process involves being able to make simplifying assumptions and approximations in order to reduce the complexity of the original setting and create a manageable problem that can be solved with the available resources. This occurs with the expectation that revisions may be necessary to obtain a meaningful solution in the end. Furthermore, the modeler must be able to determine or identify important quantities within the framework of the system, express these quantities as variables and parameters, and then represent the important relationships among these quantities in the simplified setting. In addition, the student needs to analyze the relationships using appropriate mathematical tools in order to draw conclusions and solutions from them. Finally, one has to take the mathematical solution and interpret it in the real world context of the original problem and reflect on the validity of the result in order to decide whether or not revisions need to be made in order to arrive at a better solution to the problem. Once a solution has been found, the solution and its explanation need to be communicated to a larger audience.

Two high school teachers who participated in the project used the modeling process to help students understand composition of functions by using the notion of successive discounts from the retail world. The familiarity of shopping in retail stores allowed their students to investigate the idea of applying one process (function) and then using the results in a second successive process (function) to determine the final cost of an item. The learning process started in purely concrete retail terms by having students apply one discount followed by a second discount. From this students progressively moved towards expressing the processes entirely in function form by identifying key variables in order to see the idea of applying successive functions to determine the overall discount achieved. From this contextualized setting students moved to the formal study of composing functions as a process of applying two or more functions (as abstract objects) in succession. In the process students were able to make connections between composing functions and evaluating functions – a key idea for mastery of the concept of composition of functions.

Three teachers from middle schools developed similar lessons to familiarize their students with operations involving integers. By using chips of two colors, one color for positive numbers and the other color for negative numbers, these teachers helped their students link the underlying mathematics of operations with integers to a concrete model that supported learning the rules for these operations with understanding. A basic concept essential to understanding the model involves recognition that several positively charged chips combined with an equal number of negatively charged chips results in a net balance of zero. Building on this idea, students were able to represent positive and negative numbers with varying combinations of positive and negative chips and later use the chips to explain sums, differences, and products of integers.

<u>CCSS Recommended Practice 5: *Use Appropriate Tools Strategically*</u>
Recommended Mathematical Practice 5 from the Common Core State Standards requires both teachers and students to use appropriate tools strategically. This standard requires wise decision making about which instructional tools to use and their appropriate use in classrooms. Tools may range from manipulative materials such as pattern blocks through mechanical items such as compasses and protractors to technology-based tools such as specialized software for visualizing a 3-dimentional polyhedron. Mathematically proficient students will be directly involved in these decisions about the use of materials, as they reason for themselves about the applicability and appropriateness of these tools in problem solving situations. For example, when using graphing calculators, the students may choose to quickly graph a function and report the number of zeros for the function by noticing how many times the graph intercepts the horizontal axis, if that information is sufficient to solve the problem under consideration. At the same time, these students may choose to compute the exact values for the zeros, rather than using the trace feature of the

calculator to approximate the zeros, if the problem solution requires an exact value. Students are expected to consider these types of options as their problem solving capabilities develop.

Several project participants reported on the use of tools to support instruction. For example, one participant reported on the use of Electronic Tutor to provide individualized reasoning opportunities for his notably diverse population of students.

CCSS Recommended Practice 6: *Attend to precision*

This practice is a mandate for students and teachers to communicate precisely to one another, not just share a "correct" answer. It begins with clear definitions and proper use of terms and symbols. When a topic is introduced, the mathematical language should be defined and used consistently. For example, "numerator" should be used and not "top" as a part of a fraction. It is very important that the details of the situation are included, e.g. specifying units of measure, titling and labeling graphs, using a degree of precision appropriate for the context of the problem. Some ways we might have students attend to precision:

- Ask students to clarify their answers in words, symbols and pictures.
- Ask students to critique each other's' ideas by explaining why they agree/disagree with another.
- Ask students to compare and contrast situations.

Engaging students in critical analysis of their reasoning or the reasoning of others requires the precise use of correct terms. One high school teacher provided note-taking guidance for her geometry students in the form of a work sheet on which they could build and reference definitions and examples of geometry concepts to be considered as they solved geometry problems.

CCSS Recommended Practice 7: *Look for and make use of structure*

The Common Core State Standards for Mathematical Practice (CCSSMP) Standard 7 states that "mathematically proficient students look closely to discern a pattern or structure" (CCSS, 2011). This statement underscores the importance of students understanding the concepts underlying the procedures which help them see the "big picture" of mathematics. In turn, if students see the structure behind the mathematics, they can more easily transfer their mathematical knowledge to new situations.

Within the statement of the standard itself, there are a number of mathematical examples of how students may see the underlying structure. For instance, early elementary students will notice that $3 + 7 = 7 + 3$. This use of the commutative property allows students to begin to see an underlying structure that can make learning math facts more efficient and helps them to develop flexibility in their mathematical thinking. Younger students may also use structure during shape classification tasks, an important pre-number skill taught in early elementary grades. The standard also goes on to discuss how students may decompose 7×8 into its component parts 7×5 and 7×3, which demonstrates that the distributive property is not only important in simplifying algebraic expressions, but also helps students compute products mentally.

Standard 7 also suggests use of an expression such as $x^2 + 9x + 14$ to illustrate how algebra students can see the structure in this category of trinomials, for which during factoring the students must find a pair of numbers whose product is 14 and whose sum is 9. Standard 7 then states that mathematically proficient students "also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects" (CCSS, 2011). Within the standard explanation, the example $5 - 3(x - y)^2$ is discussed. Although this expression has many components, students should also be able to see this as a single object. In this case, they should be able to see that the quantity $(x - y)^2$ represents either a positive number or zero, which implies that 3 times this quantity is also positive or zero. Thus 5 minus this value will have a maximum value of 5, for any choice of *x* or *y*.

Another example that can be used to illustrate how students should be able to see something as both a single object and as a composition of several objects is the equation $y = -x^2 + 4$. When first introduced to quadratic equations such as this one, students may not see the structure of this equation when asked to graph it on the coordinate axes. They will instead see it as a process whereby they need to choose *x* values, substitute them into the equation to find the *y* values, and then graph. However, we, as teachers, want our mathematically proficient students to see this equation as an object: a parabola that is a transformation of the parent graph $y = x^2$. We want our students to immediately see that $y = -x^2 + 4$ is reflected over the *x*-axis and is shifted up by 4. In summary, the underlying structure of mathematics helps students understand how topics within mathematics are richly connected.

The use of *Algeblocks*, and the colored chip model for understanding of the rules which govern integer operations was contained in lessons developed by three middle school teachers described earlier. The lessons illustrate the recommended practice of looking for and making use of structure. These teachers asked their students to create their own knowledge of the structure underlying integer operations. One teacher also mentioned that doing so should help students retain this knowledge. Many studies in the mathematics education research literature have in fact supported this notion.   In addition, it was great to hear that her students' performance on the posttest following instruction showed an average gain of 38 percentage points. Going forward, knowing this structure of integer operations can help these students extend their understanding to the domain of rational numbers.

Other teachers chose different representations to help their students make sense of integer operations. For example, one teacher used a number line and stairs. Another used both horizontal and vertical number lines. This, perhaps underscores that multiple representations of the same concept may often help students see the structure more clearly.

CCSS Recommended Practice 8: *Look for and express regularity in repeated reasoning*
This practice requires teachers and students to look for patterns and "big picture" …repetition in procedures and thinking. Again students need to pay attention to the details while evaluating the reasonableness of their results as they continue through the problem. They should be using reflective questioning throughout the process and do their best to relate to the problem by trying to create a situation that models the problem. Estimation skills may also be employed to determine the reasonableness of the conclusion. What we would plan for our students to learn in relation to this practice is to make conjectures about mathematical relationships, write functions after observing repeated patterns or processes, use calculators to explore graphs, recognize the effect of changing a constant in a formula, and check work during process and perform error analysis. In their action research project, two participating middle school teachers emphasized to their classes the need to generate a formula as they worked to solve a problem and always to evaluate the reasonableness of their results. They developed an activity titled, Exploring House**s,** which was adapted from *Navigating through Algebra in Grades 6-8* (NCTM, Susan Friel, Sid Rachlin, and Dot Doyle). A snapshot of the lesson follows:

Exploring Houses

Work with a partner to explore the construction of houses using pattern blocks.

House #1	House #2	House #3	House #4

- For each house, determine the TOTAL number of pieces needed
- How many squares and triangles are needed for each given house #?
- Use the squares and triangles to make house #5.
- Describe (write in words) what house #5 would look like. Draw a sketch of house #5.
- For each house, determine the TOTAL number of pieces needed
- How many squares and triangles are needed for each given house #?
- Use the squares and triangles to make house #5.
- Describe (write in words) what house #5 would look like. Draw a sketch of house #5.
- Create a table (2 columns) to show the number of pieces used to build each house.

House #	Total number of pieces
1	
2	
3	
4	
5	
15	

- Explain how to find the total number of pieces needed for House # 15.

Write a rule that tells how to find the total number of pieces needed to build any house number.

With each "house" example students explore a situation to discern a pattern or structure and create a rule for generating numeric values. This type of reasoning is foundational for algebra and creates a link from concrete reasoning to abstract generalization.

Teacher Professional Development

Overall, it is exciting to hear about the wonderful work the teachers have been doing through their classroom-based action research projects. Not only is it good to hear the answers to their research questions, it is interesting to hear what one teacher described as the "side notes": things that were learned that weren't originally anticipated. These types of reflections can filter back into their teaching to help continually improve their students' opportunities for mathematical understanding. From this perspective of helping students improve their understanding, we consider how teacher professional development can continue to build upon the initial momentum the CCSS created. Originally, we wanted to know more about the following:

- How do teachers effectively integrate recommendations from the Common Core Standards into instruction in the classroom?
- How would teachers revise their action research projects to address that question?

Several features of effective professional development are central to the success of any professional development endeavor. To be effective, professional development needs to be relevant to the professional lives of teachers, promote development of teachers' content knowledge, consider the needs of students in their classrooms, and provide sustained support for teacher change. As teacher educators we are pleased to have been able to incorporate these characteristics of effective professional development into our project. We exploited the underlying theme of the project, the use of the Common Core Recommended Practices in Mathematics to develop algebraic reasoning, geometric reasoning, and proportional reasoning. We used problem-rich, inquiry-based experiences that both the middle school and high school teachers could readily adapt for their own students. Through these experiences, we observed teachers revisiting mathematics from fresh context-relevant perspectives. Teachers deepened their own knowledge and began to build connections between their previous, often symbolic-only understandings of math and relevant real-world applications of math. Each activity was accompanied by follow-up discussion of factors related to its use with classroom students. Whenever possible, we anticipated difficulties students at various levels might encounter, considered modified instructional approaches that could address learning challenges, and planned for linking the activity to subsequent math topics.

Through our follow-up classroom visits we were able to document teachers' efforts to implement instruction consistent with the recommended Math Practices and encourage them to persevere in their efforts. We believe these observations and participants' development of their action research projects partially answer the question of how teachers effectively integrate recommendations from the CCSS into instruction in the classroom. Planning and implementing action research projects allowed teachers to observe the ultimate effectiveness of their work--its impact on students' understanding. Through their presentations at the MLCN Online Colloquium, teachers articulated features of their experiences that were planned to align with recommendations of the CCSS, as well as their reflections on potential revision of the activities to increase student understanding. We noted that many teacher reflective comments concerning how they might improve their projects focused on the following areas:

- Approximately 30% of the respondents indicated that they would try to provide more manipulatives or other representations of the mathematics they were teaching, including links between real world problems and algebraic notation. They indicated a belief that the various representations could enhance students' understanding and provide a foundation for meaningful interpretation of formal symbolic mathematics.
- Approximately 20% of the respondents indicated that they would like to increase and more carefully structure group work. One commented that his students struggled to explain their thinking even in the group setting.
- Approximately 30% of respondents indicated an intention to provide clearer directions and to stipulate learning expectations for their students engaging in a learning activity. In this area participants mentioned that they would provide more examples of concepts they were teaching and increase the number of activities they would use with students to attain those concepts. One mentioned specifically her need to develop "good" questions to help her students confront challenging features of the concepts being considered.
- And, approximately 20% of the respondents found that their methods of assessment could be improved. Some indicated that they wanted to prepare a more sensitive rubric for assessing student work. Some commented on the need for more formative assessment. One pointed out specifically the need to check on individual students' progress.

We are pleased that the teachers' reflective comments align closely with recommended practices for improvement of student opportunities to encounter and understand important, challenging mathematics. Yet, the question remains: How do we continue to use the Common Core State Standards to improve students' opportunities to learn mathematics with understanding? We found our involvement in the project to be professionally very rewarding. We found the participating teachers to be interested, interesting, cooperative, responsible, and responsive in their pursuit of new knowledge for teaching and assessment. We are confident that as we continue to work with and learn from our teachers, many can become classroom teaching leaders for peers in their own buildings. So too, we anticipate that the answer(s) to our question about building on the CCSS to improve students' learning opportunities will emerge through our continued work with teachers.

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Insights into Common Core Implementation in the Middle Grades, *by Julie Tonsing-Meyer, Ed.D.*

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Julie Tonsing-Meyer is an Assistant Professor of Education at McKendree University. She has developed educational technology curricula and prepared online courses for undergraduate and graduate programs including new courses at the doctorate level, and made numerous professional presentations regarding online training and education, STEM research, gender equity, and ways to integrate technology tools into the curriculum. She may be contacted at jatonsing-meyer@mckendree.edu.

Abstract
The movement toward the National Common Core Curriculum (NCCC) poses many challenges for classroom teachers and school administrators. One of the most significant challenges may be providing effective professional development opportunities for in-service teachers. In response to the Common Core State Standards for mathematics (CCSS-M) and in an effort to emphasize STEM education in high-need middle school grades, the Associated Colleges of Illinois (ACI) established the Math Learning Collaborative Network (MLCN). In collaboration with Illinois College and North Central College, McKendree University joined the MLCN. The McKendree MLCN collaborative team completed professional development in-service training, assisted sixth and seventh grade teachers with action research, compared state and CCSS-M standards, conducted classroom observations with classroom teachers, and participated in an online colloquium for dissemination of MLCN research findings.

Introduction
The movement toward the National Common Core Curriculum (NCCC) poses many challenges for classroom teachers and school administrators. One of the most difficult may be providing effective professional development opportunities for in-service teachers. Historically, all 50 states put in place their own content standards and objectives, leading to a highly decentralized and patchwork system, a condition that has been described as "50 states, 50 standards." Many individual state standards were so detailed and prescriptive that teachers could not possibly cover them in appropriate depth (Quay, 2010). The goal of the National Common Core Curriculum movement is to create a comprehensive set of standards that are rigorous, attainable and uniform from state to state. The resulting National Common Core Curriculum Standards (NCCCS) are designed to improve student achievement by addressing inconsistencies across state standards (Cleaver, 2011).

In the past, the inconsistency in state standards and the resulting variation in levels of rigor from state to state contributed to poor student performance. One result of weak elementary-secondary student performance has been a shortage of science, technology, engineering, and mathematics (STEM) graduates at the college level. The sense of urgency to increase the number of STEM graduates in the United States, including the number of minority STEM graduates, has grown dramatically in recent decades (Kendricks & Arment, 2011). There are equal concerns about the uneven academic performance of STEM majors resulting from widely varying state standards. Also, a stronger support system for the STEM curriculum is needed to help increase student success rates in earning STEM degrees (Kendricks & Arment, 2011).

Moreover, the achievement gap between American students and students from other developed countries is significant. In a recent comparison American students ranked 35 out of 40 countries in math and 29th out of 40 in science (Cleaver, 2011). Nationally, only 24% of students who took the ACT in 2010 scored within the range considered college ready. Again, the inconsistencies in state standards and rigor are believed to have been major contributing factors in the disappointing performance of American students when compared with many other nations on international tests (Quay, 2010).

In response to the movement toward the Common Core State Standards for mathematics (CCSS-M) and in an effort to emphasize the growing importance of STEM education in the middle school grades in high-need schools, the Associated Colleges of Illinois (ACI) created the Math Learning Collaborative Network (MLCN). McKendree University joined the MLCN in collaboration with two other ACI members--Illinois College and North Central College. The McKendree collaborative group consisted of four middle school math teachers and three faculty members from the McKendree School of Education.

McKendree MLCN Project

The collaborative team at McKendree University participated in professional development activities during the summer of 2012 by completing 80 hours of in-service training. The training involved hands-on activities in the mathematic areas of algebraic and geometric thinking, as well as proportional reasoning. Participants were encouraged to find ways to help students' link skills and concepts within and across mathematics instruction. The CCSS-M were examined in depth and compared with state standards for similarities and differences. Action research projects were developed around select algebraic curricula and implemented in the fall of 2012-13 in Belleville, Illinois, School District 118 with a goal to create transformative instructional practice around structures emphasizing regular repetitious reasoning. Classroom observations involving School of Education faculty members and classroom teachers were also conducted. As a culminating activity, the McKendree team facilitated an online colloquium for project dissemination purposes and to share research findings among all groups participating in the MLCN.

The McKendree collaborators explored CCSS-M related to the middle school grades. Professional development activities were conducted during the summer for talented mathematics teachers in low income schools. Practical research experiences in the form of action research were undertaken during the early part of the 2012-13 school year. Action research focused on diverse learning styles and their relationship to learning outcomes. Through these experiences, participants improved prospects for accomplishing their student learning objectives in mathematics and in achieving CCSS-M (Ediger, 2011).

The McKendree MLCN objectives for the summer research experience were as follows:

- To develop an understanding of the Common Core State Standards for Mathematics
- To discern how the new CCSS-M were similar and different from the previous Illinois State Learning Standards.
- To formulate an action research project to be carried out during the first quarter of the 2012-2013 school year.

Program Design and Implementation

The Common Core State Standards were developed to promote college and career-ready expectations and to ensure that students would graduate from high school ready to enter and succeed in entry-level, credit-bearing college courses without the need for remediation (King, 2011). The standards were based on the assumption that learning experiences in mathematics should incorporate content from research studies stressing optimal learner progress (Ediger, 2011). Over the summer months, the McKendree collaborative team investigated the CCSS-M in depth in the areas of algebraic and geometric thinking and proportional reasoning and compared CCSS-M with Illinois state standards for similarities and differences.

The McKendree MLCN professional development model was based on a framework created by the National Council for Teachers of Mathematics (NCTM). It was fashioned to help educators design advanced assessments and to adapt, modify, or replace existing learning experiences with ones that are more conceptually advanced and complex. In line with CCSS recommendations the focus of professional development activities was content specific and offered instruction for creating and implementing outcomes based pre and post assessments (Common Core State Standards and Gifted Education, 2008).

Teacher participants were encouraged to find ways to help students link skills and concepts within and across mathematics instruction. Action research projects were developed and implemented as transformative instruction and meaningful assessment in sixth and seventh grade algebra classrooms. Classroom observations between School of Education faculty members and classroom teachers were conducted. As a culminating activity, the McKendree team facilitated an online September colloquium to allow for the dissemination of research findings and project results of all the project groups participating in the MLCN.

Results and Discussion

The McKendree University MLCN collaborative team demonstrated that mathematics common core related practices used in sixth and seventh grade classrooms improve student learning. The 80 hours of professional development strengthened the teachers' understanding of the standards and how to implement them successfully, helped identify the incongruences and similarities between CCSS-M and the Illinois State Learning Standards and facilitated completion of the fall action research projects. As a result the mathematics teachers on the MLCN team played a vital role in guiding pupil progress toward meeting common core standards.

The teachers discovered that the mathematics curriculum needed revisions in order to improve student achievement in the common core. The teachers found that the curriculum must better assist students to comprehend and attach utilitarian meaning to their ongoing mathematical experiences. Students' ability to make tangible connections with the real-world proved to be an absolute necessity. To be effective, according to one of the classroom teacher participants, mathematical learning must enable students "to reason abstractly and quantitatively, as well as to be able to justify their thinking to others.” Concrete models and examples need to be used to anchor mathematical thinking. The common core provides effective guidance to help ensure that major mathematical concepts have this grounding (Ediger, 2011).

In evaluating accomplishment of project goals, 100% of the participants agreed that their understanding of the CCSS-M increased. Prior to the onset of the collaboration, little professional development had been undertaken with the CCSS-M in mind. In addition, 100% of the participants felt they were “better able to identify the similarities and differences" between the CCSS-M and Illinois state standards." All of the classroom teacher participants formulated and completed an action research project during the first quarter of the 2012-2013 school year. The action research projects focused on algebraic thinking. Specifically, in sixth grade the focus was “Write and evaluate numerical expressions involving whole-number exponents” (Common Core State Standards and Gifted Education, 2008). The specific focus for the seventh grade teachers was “Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients” (Common Core State Standards and Gifted Education, 2008).

Based on the data collected from the MLCN professional development initiative, we discovered that math in the real world cannot be presented authentically as a simple problem. Moreover, we found that developing mathematical curricula using the CCSS-M is more time consuming than following the state standards in the past. More time was necessary in the curricular planning stages to ensure student mastery of mathematical knowledge when real world applications are used. As a result of their project experience the participating teachers plan to incorporate more problem solving and real world functionality in their lesson problems and equations for next year.

Conclusion

Our project demonstrated that high quality, needs-based professional development can make a substantial difference in teachers’ knowledge and skills. Such professional development should be a priority now that adoption of the

National Common Core Curriculum is a reality in Illinois as well as other states. Administrators and teachers must be prepared to implement new instructional strategies aligned with the standards in order to ensure improvements in mathematical learning for all students.

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The Perplexing Challenge of Transitioning to the Illinois Common Core Standards, *by Debra Loomis, Ed.D. and W.M. Duce McCune II, Ph.D.*

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Abstract
The transition from the Illinois Learning Standards to the newly adopted Illinois Common Core Standards has proven particularly challenging for educators. The Common Core raises the academic bar for students in Illinois considerably. Unfortunately, many students failed to achieve even when the old standards were in effect. This shortcoming can be mitigated through partnerships between schools and institutions of higher education. These partnerships carry the potential for benefitting both parties while improving instruction for all students.

Introduction: the ILS-CCSS Gap
Two years ago, while instructing pre-service teachers to align math skills to the Illinois Learning Standards (ILS), Eureka College faculty recognized the significant challenges school districts would encounter in making the transition to the Illinois Common Core Standards (ICCS). With the release of the Common Core State Standards (CCSS), the instructor and students in a math methods course for special education majors discovered where this math skill would be taught under the new standards. Everyone, including this instructor, was shocked to find the skill two grade levels below where it had been in the ILS.

Special educators are used to dealing with instructional gaps through increased intervention and scaffolded instruction for small numbers of students. However, this transition to ICCS impacts not only special education, but all other types of students except the gifted in any given classroom since prerequisite skills are not established. The enormity of this gap may not have been recognized for those with minimal teaching experience, but for a practicing elementary or junior high teacher, classes with instructional gaps of two years are a cause for panic. Furthermore, this is occurring at the same time teachers are being evaluated under a new state evaluation tool that is highly dependent on their students' academic performance.

How serious is this challenge in Illinois? Keeping Illinois Competitive (Northern Illinois University, 2006) is a report compiled by the Northern Illinois University P-20 Task Force in collaboration with the Illinois Business Roundtable. The purpose of the report was to evaluate the status of science, technology, engineering and math (STEM) education in the state. The report demonstrates that students in Illinois represent some of the very best and brightest competitively on an international level. However, Illinois students are also represented at the lowest achievement levels. The authors'

conclusion: Illinois "…has some of the largest achievement gaps in the U.S." (p. 5). In fact, only seven states have a greater gap in educational attainment (Illinois Board of Higher Education, 2009).
Currently, less than 20% of the school districts in Illinois are making adequate yearly progress (Northern Illinois University, 2012) based on assessments aligned to the ILS. In this context one might wonder how student performance in Illinois can improve when the state is adopting more rigorous learning standards. This feat can only be possible through the intentional and near-immediate application of high-quality, evidence-based practices.

Implementation of CCSS

How will the adoption of CCSS help students in Illinois? The intent of the new standards is to prepare students for college and the 21st Century workforce (National Governors Associations Center for Best Practices & Council of Chief State School Officers, 2010). The English Language Arts standards are based on the framework of the National Assessment for Educational Progress. The Math standards have been developed in part through evidence from Trends in the International Mathematics and Science Study (TIMSS). The CCSS are organized in a fashion that "staircases" skills from the basic to more complex, requiring more in-depth learning and application at each level. For students in the early elementary grades, the use of less broad, more in-depth, sequential standards has promise for improving academic achievement. For students in upper elementary, middle school, and high school, however, the question remains on how to fill the instructional gap.

The CCSS standards also take an approach that interweaves skills across academic areas. An example of this cross-curricular organization is reading in the content areas. The new standards will require all teachers to instruct on literacy within their subject areas. These features of the CCSS "are favorable for implementing teaching practices that research has shown to be effective with all students, particularly students with learning disabilities and those who are English learners" (WestEd, 2012, p. 3).

McLaughlin (2012) addresses the CCSS from the perspective of teaching students with disabilities. She believes the universal design of the CCSS will give unprecedented access to the general curriculum because the standards are written in a manner that in many cases does not dictate "how" a student demonstrates mastery of the standard. This not only allows accommodations to be made for those with a disability, but also enables students with diverse learning profiles to demonstrate content mastery through multiple means of expression, while maintaining the integrity of the standard.

The universal design of the standards could create a dilemma in the design and implementation of standardized tests. Universal Design for Learning (UDL) provides a framework for students to demonstrate learning through multi-modal, flexible means of expression. If it truly is the case that students can demonstrate mastery of a standard in a manner independent of modality, it will be difficult to build validity into a new state assessment that requires all students to demonstrate learning through a single modality.

Flexibility with respect to the modality of output required in the CCSS may be limited, however. The National Center on Universal Design for Learning (n.d.) identifies some CCSS that do not meet UDL criteria because of the specificity of the output, such as writing, listening, and speaking, used within the learning goal. Teachers must recognize that the means of output in the CCSS may create a barrier in the mastery of these skills, and that they will need to make adaptations, as necessary, to allow students to demonstrate their knowledge.

Eureka College Grant Collaboration

How can higher education help with this dilemma? McLaughlin (2012) believes instruction and assessment are critical to successful implementation of the CCSS. The Eureka College teacher education program is preparing pre-service teachers in evidence-based instructional and assessment practices and supporting practicing teachers through professional development. The program has been strengthened over the last four years from involvement in three federal grants. The original grant, in collaboration with University of St. Francis, Dominican University, Aurora University, and Lewis University, focused on evidence-based practices in special education. The goals of this grant included improvement in student math, science, and clinical experiences. The opportunities afforded through the grant allowed a small liberal arts college like Eureka College to stay abreast of the development of practices that have a strong level of foundational research.

Through grant funds, special education and elementary education faculty became trained in the co-teaching model of student teaching from St. Cloud State University and Strategic Instruction Model strategies from the University of Kansas. This professional development prepared faculty for the rigorous demands of helping teachers make the transition to the CCSS. Collaboration among these teacher education programs has also led to the development of a highly scaffolded UDL lesson plan that is used across all teacher preparation programs at Eureka College. Teacher candidates are taught to recognize learning differences among students in the classroom prior to developing a lesson. Through multiple means of representation, engagement, action and expression, the teacher candidates will address student needs during instructional planning based on the CCSS rather than through remediation. Within the plan, teacher candidates are prompted to think about the evidence-based practices they are utilizing to teach concepts. Accommodations and individualized outcomes are also considered within the lesson plan.

The other two grants were Doing What Works Implementation Awards. Doing What Works (DWW) is a website developed and supported by the U.S. Department of Education. The DWW goal is "to create an online library of resources that may help teachers, schools, districts, states and technical assistance providers implement research-based instructional practice" (U.S. Department of Education, n.d.). The content of the website is based on the compilation of research from the Institute of Education Sciences (IES) and the What Works Clearinghouse (WWC). The website is organized into six categories that provide a drop-down menu of multiple topics for each category. Within the topic multiple educational practices are available to choose to learn about. The website can be accessed at www.dww.ed.gov.

Doing What Works Website

The "meat" of the Doing What Works website is contained within each of the six categories of practice. The practices are all organized by what appears to be file folder tabs labeled as Practice Summary, Learn What Works, See What Works, and Do What Works. The Practice Summary gives an overview of the practice, usually in video or slide format. The Learn What Works section features expert interviews on the use of the practice, key concepts of the highlighted practice, and references to the research conducted on the practice. A level of evidence for the research is also provided, ranking the research support as low, moderate, or strong. Another valuable resource in this section is the Related Links feature. See What Works is where the practice can be viewed in a classroom setting. Practitioners in the field share their experience with the practice and share resources that may be downloaded by visitors to the website. Doing What Works provides additional tools and templates for use by school leaders, district administrators, and state education agencies.

With the award of the first DWW grant, Eureka College focused on Math. DWW math topics were first introduced in a special education math methods course that included guest faculty from the math department. A significant focus was placed on the Concrete Representational Abstract (CRA) sequence of instruction for math concepts. Students were taught to use number lines when working with fractions, strip diagrams for problem solving, and concrete objects to solve algebraic expressions. Our work with CRA carried over to providing free professional development to practicing teachers in three half-day sessions. One topic was addressed each session with an expectation that the teachers would go back to the classroom and implement the new strategy and report back during the next session. Readings were assigned from resources available on the DWW website to prepare teachers for engagement in the learning activities.

Concrete Representational Abstract (CRA)

CRA is an evidence-based practice, but how well does it align with the CCSS? Actually, CRA aligns very well with the new Illinois Common Core Standards (ICCS) in mathematics:

- Standard 1 requires students to persevere in problem solving. This may include the use of concrete objects or representations.
- Standard 2 addresses reasoning skills that may be supported through manipulating, representing, and using symbols.
- Standard 3 requires students to critique the reasoning of others. Students may use concrete objects to support their argument.
- Standard 4 requires students to model their problem solving through visual representations.
- Standard 5 involves the strategic use of tools in problem solving which includes the use of concrete models.
- Standard 7 addresses structure. Students will use objects and drawings to solve algebra and geometry problems.

CRA is a practice that weaves through the anchor math standards from the earliest levels to high school.

Language Arts Standards

The award of the second DWW grant changed our focus to literacy. The new Illinois Professional Teaching Standards require teacher preparation for reading in the content areas. Eureka education faculty decided to develop engagement guides for the topic of adolescent literacy on the DWW website that would be used across three certification programs: elementary education, secondary education, and special education. The programs will be utilizing the IES Practice Guide resources conceptualized on the DWW website to facilitate acquisition of knowledge in content area reading and remediation for struggling adolescent readers. The education faculty's work will also include alignment between CCSS/ICCS English Language Arts Standards and the practices advocated within DWW Adolescent Literacy. An additional alignment of the Illinois Professional Teaching Standards will be addressed by the secondary education majors.

The vision of the Eureka Education faculty for the CCSS alignment was the development of a matrix that would go from the DWW practice to the identified standards and also work in reverse for teachers trying to find resources for specific standards. The enormity of this project was not realized until one of the team members created a data file that itemized each of the nearly 1,000 English Language Arts standards.

Challenges for Teachers of DWW Alignment with CCSS

The enormity of aligning DWW modules with the new CCSS is reflected in conversations with pre-service teachers attempting first to understand and then learn how to apply the new standards in their practice. Comments from students regarding the challenge of learning the new standards seem to fall into three categories. Interestingly, these categories reflect three of the biggest strengths of the CCSS:

1. Teachers must actively target standards not traditionally associated with their discipline. For example, the new ELA standards include a strand dedicated to the reading of instructional and technical texts. Since these types of texts are frequently encountered in math and science classes, teachers in these areas must now include instructional objectives that specifically target reading.
2. The CCSS are designed to provide continuity across multiple dimensions. This continuity is reflected in the organization of the standards by strand and in the inclusion of anchor standards that both apply across multiple grade levels and in the numbering sequence of the standards themselves. Preserving the continuity of all these dimensions simultaneously on paper is difficult, making explicit instruction into the nature of the

CCSS challenging. However, in order for teachers to design instruction that is sensitive to this continuity, they must be able to fluently navigate this new system.

3. The CCSS build upon systems of standards already in place. Thus, existing textbooks and evidence-based practices are still extremely useful, but until researchers and publishers have time to realign texts and practices to the CCSS, teachers bear the burden of completing this realignment themselves.

Evaluation of Teacher Education Programs?

School districts and their teachers may not be the only ones held responsible for improving curriculum and instruction; a White House Panel has recommended that the Obama Administration develop a method for evaluation of teacher preparation programs (Klein, 2012). In this age of accountability, teacher preparation programs must stay focused on producing a teacher candidate possessing strong academic skills who is also well-grounded in evidence-based practice, knowledge of UDL, and data-based decision making. Effective teachers using the ICCS as instructional targets will recognize the academic gaps early through data collection and respond with practices such as those advocated in the IES Practice Guides and Doing What Works. With school district and higher education collaboration, this challenge can be met!

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"New Year Intentions": To Know, Understand, Interpret, and Implement the English Language Arts Common Core Standards, *by Laura Beltchenko*

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As educators nationwide ponder the impending reality and interpretation of the English Language Arts Common Core Standards (ELA CCSS), it is paramount that they begin to consider their instructional implementations. The new standards challenge Pre-K-21 educators to apply educational best practices in preparing their students for college and career readiness. The new standards build on notions of learning progressions and developmental instructional scaffolding that is gradually removed to begin to create independent readers, writers, listeners, speakers and thinkers. "Anchor Standards" keep us grounded while the grade level standards build the stamina for continual growth with greater depth and complexity of knowledge and comprehension.

Unlike the Illinois Learning Standards adopted in 1997, we have a continuum of Kindergarten – Grade 5 ELA standards and imbedded within them are history/social studies and science implications that ensure a balanced attention between literary and informational text. This attention to reading informational text continues in a separate set of standards created for grades 6-12. The intent is to have ALL educators share the responsibility of reading and writing in content subject areas in middle and high schools.

So how should we tackle implementation of these standards? As I pondered this question I determined that the sequence of steps in the scientific method might provide a framework for this exploration. After all, integration of subject matter is part of the mantra to which the new standards aspire!

1. *Ask a Question*
What are the English Language Arts Common Core Standards and where should I begin my understanding of this Kindergarten – grade 12 document? What do I need to know, understand and be able to do to best develop and instruct from a new set of standards that are nationally based? What skill sets do I need to best service my students in the era of these new standards?

2. *Do Background Research*
The first area of research is to know, understand and discuss Appendix A of the new standards with colleagues. This appendix is the clarifying document of the ELA CCSS. It provides educators at all levels with the language and teaching vernacular/terminology and standards content information necessary to interpret and implement them. Appendix A clarifies modes of writing and language arts skills development as well as what is meant by speaking and listening. An explanation of what is meant by "text complexity" is also discussed. Overlooking Appendix A and jumping directly into grade level standards would be like missing the hypothesis step in the scientific method. The following web address will take you to this clarifying document: http://www.corestandards.org/assets/Appendix_A.pdf

The second area for research in this inquiry is the "Six Instructional Shifts" in the ELA CCSS. The ELA CCSS are intended to change practice in content, instruction and assessment. These "instructional shifts" are:

- Pre-K-5 Balancing Informational & Literary Texts
- 6-12 Building Knowledge in the Discipline
- Staircase of Text Complexity
- Text-based Answers

- Writing from Sources
- Academic Vocabulary

The following QR code provides my adaptation (as it might pertain to Illinois classrooms) of the instructional shifts, as presented by two of the lead authors of the ELA CCSS, Susan Pimentel and David Colesman. I have elaborated on each shift and provided additional bullet points for fidelity of implementation. This document will share: what students, teachers/librarian and administrators should know, understand and do in each of the six major points the standards develop. (Download on your smartphone or tablet the QR Reader/Scanner App. Then point and focus your device at the code and the application will scan and create the documents. They can then be emailed to you for additional access.)

The third area of the standards that should be researched before constructing a hypothesis is a review of the ELA CCSS Anchor Standards. They are the over arching focal point of what the standards intend for our teaching. Review these standards before looking at the grade level specific standards. A set of Anchor Standards has been developed for reading, writing, language, speaking and listening. These can be accessed by going to: http://www.corestandards.org/ELA-Literacy/ and clicking on Anchor Standards.

A strong example is Anchor Reading Standard 1: *"Read closely to determine what the text says explicitly and make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text."* This standard is the essence of reading for meaning, comprehension and metecogniation. Dr. P. David Pearson, renowned researcher in the area of reading comprehension at the University of California at Berkley recently shared his views with regard to the ELA CCSS, "Comprehension involves building models of what a text says, what it means, and how it can be used," (Pearson, 2012). *How it can be used* is the key phrase in his statement. These standards are about transferring instruction into *usable* knowledge and long term understandings.

3. *Construct a Hypothesis*
After reviewing Appendix A, the Six Shifts and the Anchor Standards; begin to construct a hypothesis as you address your thoughtful questions. Look at what you currently do to address the educational issues presented. Remember, these standards do not require that you become a grammarian. They so ask all (including science educators) to "rethink" educational practices in terms of subject collaboration and coordination. The standards are not without controversy as Pearson (2012) explains in his research foundations manuscript on the ELA CCSS standards. The QR Code will take you to the link for the full article.

4. *Test the Hypothesis by Doing an Experiment*
Ok, it is now up to you. What will you tackle first in your experiment? After the first steps indicated in this scientific chronology, look at the grade level standards. Then remember that with all standards comes an assessment. Please keep in mind that the assessment consortium that Illinois belongs to is Partnership for Assessment of Readiness for College and Careers (PARCC). A new assessment will replace the existing reading mathematics Illinois Standards Achievement Test and the Prairie State Achievement Exam in the 2014-15 school year. (At this juncture the New Generation Science Standards are about to be released in their final format, however the assessment protocols have not yet been clarified.) For additional information on PARCC please access this link: http://www.parcconline.org/

5. *Analyze Data and Draw a Conclusion*
In steps 1-4 of "the method," I have presented multiple points of view for implementation of what the standards provide, including an opportunity to do a "close reading" and find the "textual evidence." This research process assists us in analyzing the data (standards) and draw instructional conclusions. What first impressions do the standards suggest? Who might we collaborate with to analyze and develop delivery of the standards and the instructional

implications? To further clarify the notion of "close reading" please refer to an article by Nancy Boyle, from the most recent issue of the Educational Leadership journal, a publication of ASCD. She helps us to draw important conclusions about the implications of reading science texts and related materials (Boyle, 2012).

6. *Communicate the results*
What we need to communicate to our fellow educators and to our students is that these standards are intended to be integrated. One can't teach reading without writing. Reading and writing take place in all subject areas. When aligning these standards, begin the development process of reading and writing side by side. The standards invite additional queries, such as what should be evident in good instruction and how the implementation process will be evaluated.

There is much work to be done. Each step should be revisited to realize the potential of the standards. Comparisons with other states will help to create a system of support for the future achievements of our college and career ready students. To further your learning about the standards in Illinois, please refer to the Illinois State Board of Education website at http://www.isbe.net/common_core/, then follow the Navigation tools on the right to support data gathering regarding your professional hypothesis.

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The "Alphabet Soup" of Program Re-Design: One School's Story, *by Rebecca L. Nelson, Ph.D.*

Author Bio
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Introduction
CCSS, IPTS, ISLLC, IPSLS, SREB, CCSSO, and SEPLB. The BST is now the TAP and not to be confused with TPA. ICTS--Oops, it's now ILTS. What do all of these abbreviations in teacher education mean?

Like all Illinois colleges and universities, the School of Education at North Park University has embarked upon a major program re-design which is impacted by the "alphabet soup" so pervasive in teacher education. Standards arising from a variety of oversight agencies and professional and accreditation associations sometimes collide with each other in the re-design process, yet all must be meaningfully incorporated in the process and product. State mandates and standards form the elements that will be evaluated when each new program is submitted for approval. The nine Illinois Professional Teaching Standards have over 125 knowledge and performance sub-standards that must be woven into new programs at introductory, developing, and proficient levels of mastery.

In addition to these requirements, redesign has been shaped by Charlotte Danielson's *Framework for Teaching* which has become the widely accepted manual for best practices in teaching, significantly impacting both teacher preparation and teaching in P-12 schools.

How did we begin?
During the 2010-11 academic year, the North Park School of Education faculty became a professional studies group to read, discuss, and reflect upon Danielson's book, *Enhancing Professional Practice: A Framework for Teaching.* Meeting monthly, we engaged in conversations regarding best practices, as well as effective ways to implement the four domains of the Framework in our teacher preparation program. The four domains are Planning and Preparation, Classroom Environment, Instruction, and Professional Responsibilities. At the conclusion of the year, we adopted the Framework as our clinical model which required an overhaul of our clinical practices, including the procedures and forms used for classroom observations.

What came next?
During the 2011-12 academic year, we began our program re-design with simultaneous initiatives for the beginning of our program and initiatives for the end of our program. First of all, professors who taught courses in our students' first-term education classes (Term A Foundations) met regularly to discuss the content needed by our beginning pre-service candidates, while introducing the focus on implementation of standards and the significance of educational language. We completed a crosswalk between the Danielson model and the Illinois Professional Teaching Standards. We then assigned specific elements from the standards to the four courses in our students' first term: Introduction to Teaching: Professional Responsibilities; Educational Psychology; Curriculum: Planning and Preparation; and Instruction and Assessment. We eliminated our Teaching with Technology class, deciding to incorporate elements from this course throughout our program.

Looking at the end of our program, we carefully reviewed the clinical elements that are the culmination of our program. Knowing that this is where they "put it all together," we needed to insure that candidates' clinical experiences would be meaningful and authentic. This review will culminate in yet-to-be-determined changes to our structure as our program re-design is completed.

North Park students begin to develop professional portfolios in their very first education course. These portfolios are organized into nine sections for the nine Illinois Professional Teaching Standards. Portfolio artifacts are chosen throughout the program to demonstrate student understanding and growth in all areas necessary for effective teaching. The artifacts are also aligned with the Common Core State Standards, the North Park Conceptual Framework, and the Danielson Framework. Through using the portfolio throughout their program, we help our candidates keep a focus on both the standards their students must master (CCSS) and the standards candidates themselves must master to become effective and licensed teachers (IPTS and Danielson).

During the summer of 2012, we immersed ourselves in the requirements of the Teacher Performance Assessment (TPA) test, attended professional development programs the Associated Colleges of Illinois (ACI) sponsored, and studied documents regarding the TPA. Recognizing that this mastery must be demonstrated at the end of each student's program, we are incorporating TPA into all clinical experiences.

Next Steps

During this 2012-13 academic year, we are waiting for the Illinois State Board of Education (ISBE) to delineate the new teacher licensure structure so that we can revise our methods classes, aligning them with the specific grade levels as determined by the new configuration, as well as continuing our work with standards and best practices.

The Teacher Performance Assessment, the final test that candidates must take and pass prior to licensure, is a dramatic departure from past measures. The TPA requires authentic assessment through recorded practice teaching vignettes and in-depth candidate reflections in specific areas that are measured by identified rubrics. With the addition of iPads for all clinical faculty this year, we are learning how most effectively to assist our candidates to reflect on their teaching for these recordings.

The school administrator perspective

As a former principal and superintendent of schools, I have no question but that all candidates who graduate from teacher preparation programs must both be well trained in effective teaching practices and be reflective practitioners. During my public school career, I interviewed hundreds of candidates for teaching positions. Some were well prepared and confidently answered questions about the Danielson framework, standards, and the act of teaching. These were the candidates to whom we offered contracts. Others were unprepared to discuss these elements and they were not hired.

The bottom line--to insure our candidates' effectiveness and marketability, we must prepare them with clarity of expectations, knowledge of standards, and the skills to implement effective teaching and learning practices.

In conclusion

The process of program redesign has been challenging, messy, and frustrating, but also exciting and enlightening. By engaging our faculty in professional dialogue and delving deeply into implementation of new standards, we believe that our redesigned program will prepare our students to be highly effective twenty-first century teachers. In keeping with the North Park University School of Education conceptual framework, our graduates will be competent, respectful, reflective professionals dedicated to careers of service…and be well-trained in the "alphabet soup" of teaching and learning.

Glossary

BST	Basic Skills Test
CCSS	Common Core State Standards
CCSSO	Council of Chief State School Officers
ICTS	Illinois Certification Testing Service (now ILTS, Illinois Licensure Testing Service)
IPSLS	Illinois Professional School Leader Standards
IPTS	Illinois Professional Teaching Standards
ISLLC	Interstate School Leaders Licensure Consortium
SEPLB	State Educator Preparation and Licensure Board
SREB	Southern Regional Education Board
TAP	Test of Academic Proficiency
TPA	Teacher Performance Assessment

Reference

Danielson, Charlotte. (2007). *Enhancing Professional Practice*: *A Framework for Teaching*. Alexandria, Virginia: ASCD.

Pre-service Teachers and Laptops: Technology Integration in a Practicum Experience, *by Theresa L. Overall, Ph.D. and Grace J. Ward, Ed.D.*

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Abstract
A pre-service teacher program that utilizes learning communities and cohorts as well as authentic learning and one-to-one laptops has created a 12-credit practicum experience for students in their second year of the four-year university program. The program addresses the need for the next generation of teachers both to experience technology integration from a student perspective as well as learn how to integrate technology as a teacher. While learning curriculum design, standards-based instruction, assessment procedures, and classroom management in courses on campus, the program's future teachers gain technology integration skills and apply their learnings in the classroom under the guidance of a mentor teacher.

Introduction
There is compelling need for teachers of the 21st century to infuse technology into their teaching and into their students' learning (Darling-Hammond et al., 2005). Taking on the task of preparing the next generation of teachers requires that colleges of education retool their traditional training programs. The secondary/middle education program at University of Maine at Farmington has responded to this challenge in its recent efforts to redesign the teacher education curriculum.

The State of Maine has been a leader in the field of technology integration in the classroom since September 2002 when every seventh and eighth grade student and teacher in the state was issued a laptop as part of the Maine Learning Technology Initiative (MLTI). Significant planning went into the design of MLTI including hardware and software selection, establishing technical infrastructures, providing Internet access, offering professional development, and supporting teachers and other personnel through virtual and face-to-face cohorts across our rural state. In 2009, the program expanded into the high schools through a new funding model that allowed 90% of high school students in the state (grades nine through twelve) to have a laptop or netbook provided by the district. In spring 2013, a contract will be awarded that will take the MLTI program into a new realm of digital devices (maine.gov, n.d.). To be successful in Maine middle and high schools, teachers need to be prepared to teach using technology. Educating pre-service teachers in technology integration as well as providing opportunities to apply technology integration in a classroom is a critical component of the secondary/middle education program.

In summer 2012, the State of Maine adopted the National Educational Technology Standards for Teachers (NETS-T) as a requirement for teacher certification. New teachers will have to demonstrate their ability to meet these standards.

Developed by the International Society for Technology in Education (ISTE), the NETS-T “are the standards for evaluating the skills and knowledge educators need to teach, work, and learn in an increasingly connected global and digital society. As technology integration continues to increase in our society, it is paramount that teachers possess the skills and behaviors of digital age professionals” (ISTE, 2012b).

This paper tells the story of how one teacher preparation program in Maine is meeting the challenge of preparing pre-service teachers to be 21st century teachers and leaders while meeting the NETS-T standards and successfully using technology in their classrooms.

Literature Review

Pedagogy is a key aspect of pre-service teacher education when future teachers are learning about the developmental stages of children and adolescents and the learning approaches that are most successful with each age group based on the internal cognitive structure of the developing brain. Pre-service teachers, however, are adults who will utilize andragogy--learning strategies focused on the needs of adult learners--to become effective teachers. Fidishun (2000) explains the relationship between andragogy and technology: "The principles of adult learning theory can be used in the design of technology-based instruction to make it more effective. Malcolm Knowles’ theory of andragogy allows teacher/facilitators to structure lessons which are part of a relevant learning environment for adults students" (p. 1).

Many current pre-service teachers did not have technology in their classrooms during their K-12 student experiences. Since these future teachers did not learn their content with technologies as tools for learning, they need specialized instruction on how to teach their subjects with new technologies (Niess, 2008). However, even students who did learn their content with technologies could still benefit from instruction on how to integrate technology into their teaching effectively, especially if their teachers in K-12 did not use best practices. One strategy to counteract this deficit is for university professors to "model" the use of technology in their classes. Excellent teachers model the skills they want their students to learn, especially complex skills (Pressley et. al., 2002). Infusing technology into a teacher education course and modeling the use of technology in a variety of ways gives pre-service teachers new insights "into the power of technology as a professional and pedagogical tool" (Rosaen, Hobson, and Khan, 2003, p. 283). While the future teachers are in their student role, they can experience and understand the "potential of technology in the learning process" (Hall, 2006, p. 437).

In addition to having effective teaching with technology modeled for them, pre-service teachers need to learn to design curriculum (units of study and series of lessons) and then have field-based experiences implementing curriculum where they can try out and reflect on their new learnings (Niess, 2008). Integration of technology into these plans "requires that they develop a pedagogical reasoning that integrates what they know about the subject, teaching, student learning, and the technologies" (Niess, 2008, p. 231). Niess is referring to Shulman’s Model of Pedagogical Reasoning “which comprises a cycle of several activities that a teacher should complete for good teaching: comprehension, transformation, instruction, evaluation, reflection, and new comprehension” (InTime, n.d.). As a result of these rich integrated experiences, "pre-service teachers can experience a role reversal as they bring new technology strategies from their college classroom to the K-12 classroom. The mentor has the pedagogical knowledge while the pre-service teacher has the technology knowledge" (Rosaen, Hobson, & Khan, 2003). The TPACK framework (Mishra & Koehler, 2006) “builds on Shulman's (1987, 1986) descriptions of [Pedagogical Content Knowledge] (PCK) to describe how teachers’ understanding of educational technologies and PCK interact with one another to produce effective teaching with technology” (Koehler & Mishra, 2009, p. 62). In the TPACK model, there are three main components of teachers’ knowledge: content, pedagogy, and technology. “Equally important to the model are the interactions between and among these bodies of knowledge represented as PCK, TCK (technological content knowledge), TPK (technological pedagogical knowledge), and TPACK” (Koehler & Mishra, 2009, p. 62).

The SAMR model describes a continuum of four different levels of technology integration, which was developed in the early 1990's by Ruben Puentedura. The four areas--substitution, augmentation, modification, and redefinition--give pre-service teachers a framework to develop technology integration skills within their teaching and learning. The enhancement level includes substitution (in which "Tech acts as a direct tool substitute, with no functional change") and augmentation ("Tech acts as a direct tool substitute, with functional improvement"). Modification ("Tech allows for significant task redesign") and redefinition ("Tech allows for the creation of new tasks, previously inconceivable") are at the transformation level (Puentedura, 2012, slide 6). When the SAMR model is used by teachers (either pre-service or in-service) to better understand effective technology usage in the classroom, the technology component of TPACK is better defined. In combination the SAMR and TPACK models bring the creativity and innovation of technology usage into the learning process for both teachers and their students (Puentedura, 2012).

The NETS-T (ISTE, 2012b) build on the foundations of Shulman's Model of Pedagogical Reasoning, TPACK, SAMR, and the idea of modeling as an important part of a learning experience. The NETS-T is comprised of five standards and 20 performance indicators. The second standard requires that teachers be able to "design and develop digital age learning experiences and assessments." For pre-service teachers to be able to meet this standard they must be familiar with the NETS-S in their designing of learning opportunities but they must also possess all the skills themselves. Standard 3 requires that teachers "model digital age work and learning" while Standard 4 requires that teachers "promote and model digital citizenship and responsibility." The overarching standard is the first one--that teachers "facilitate and inspire student learning and creativity." In order to do all these things, teachers must enrich their professional practice on an ongoing basis, which leads to Standard 5, "engage in professional growth and leadership."

A successful professional development practice for adult in-service teachers who work together or have common interests is the formation of professional learning communities (PLC), defined as "Educators committed to working collaboratively in ongoing processes of collective inquiry and action research to achieve better results for the students they serve. Professional learning communities operate under the assumption that the key to improved learning for students is continuous job-embedded learning for educators" (Dufour, Dufour, Eaker, & Many, 2006, p. 2). The learning community model has been successfully applied to undergraduate education as a curricular structure "that link[s] together several existing courses--or actually restructure[s] the curricular material entirely--so that students have opportunities for deeper understanding of the material they are learning and more interaction with one another and their teachers as fellow participants in the learning enterprise" (Gabelnick, MacGregor, Matthews & Smith, 1990, p. 19). Members of learning communities collaborate to analyze, question, "dig deeply," and give feedback in order to learn and achieve (DuFour, 2005; Fullen, 2005, p. 209; Gabelnick et. al., 1990). The integrated curricular approach is a highly recommended approach for use with complex topics (Sands & Barker, 2004).

The complexities of teaching go far beyond classroom management, technology integration, curriculum design, instruction, and assessment. Teachers often take on the roles of surrogate parent, police officer, counselor, career counselor, and social worker (Craven, n.d.). Authentic learning is described as "going beyond content, . . . [it] brings into play multiple disciplines, multiple perspectives, ways of working, habits of mind, and community" (p. 2-3). Though the field experience provides pre-service teachers with a real-world setting to practice skills learned in the classroom, the total package of Practicum Block is designed to provide authentic learning for future teachers. According to Lombardi (2007), "[A]n authentic learning event essentially encourages students to compare their personal interests with those of a working disciplinary community: 'Can I see myself becoming a member of this culture? What would motivate me? What would concern me? How would I work with the people around me? How would I make a difference?'" (p. 4)

An additional strategy for improving learning for future teachers is to create a cohort experience. Being part of a cohort, which Drago-Severson et.al. (2001, p.1) define as "a tight-knit, reliable, common-purpose group," has been proven important to the success of adult learners. A cohort experience can make a critical difference in the academic success of the individual members of the group as well as enhance their emotional well-being and expand their perspective (Drago-Severson, et. al., 2001; Seifert, & Mandzuk, 2004). Cohorts serve as "dynamic transitional growth spaces" that help learners "make good use of each other by providing both the challenge that encourage[s] learners to grow and the support they [need] to meet those challenges" (Drago-Severson, et. al., 2001, p. 16).

Program Background

University of Maine Farmington (UMF), a public liberal arts university in Western Maine, has 2,000 undergraduates and a teacher preparation program with an excellent reputation. Eighty percent of UMF's students are from Maine; approximately half of these are the first generation to attend college in their family. Approximately 90% of all full-time, degree-seeking UMF students receive some form of financial assistance (UMF, 2013; INBRE, 2012). These demographics are reflected in the population of the secondary/middle education program. The program typically has 300 teacher candidates enrolled in five different concentrations (English, math, science, social studies, and community health). The University has been known for high quality teacher preparation since its founding in 1864 and strives to improve the program to meet the needs of tomorrow's learners. One such innovation was the implementation of a combined practicum experience with coursework for second year pre-service teachers.

Prior to spring 2004, the first field experience for secondary/middle education pre-service teachers consisted of being in a classroom two mornings a week over a 12-week period for a total of 72 hours. Because the University students typically had not had a curriculum course prior to the Practicum experience, mentor teachers either had to assist pre-service teachers with very limited skills in constructing a lesson plan, or mentor teachers never gave Practicum students the opportunity to try their hand at teaching, thus relegating the field experience to observation only.

In the spring of 2004, more pre-service teachers needed the required Practicum experience than there were spaces available. To meet this need a special May semester course was added: a 4-week, intensive, full-day experience consisting of a seminar on Monday and full days in a classroom on Tuesday, Wednesday, and Thursday for a total of 72 hours. The unexpected bonus of the May course was the full-day experience. The field supervisor of this special May semester course had also taught Practicum in prior regular-length semesters where some pre-service teachers were taking Curriculum and Instruction simultaneously, some were taking Instructional Media simultaneously, some were taking both curriculum and technology classes, and the rest were taking only the Practicum experience. The May semester instructor's classroom observations of the pre-service teachers led her to conclude that those taking the simultaneous classes had a better Practicum experience.

The field supervisor of the May semester course discussed her conclusions with the faculty members in Curriculum and Instruction and Instructional Media. They decided that if they could combine the experience of the May semester pre-service teachers and the experience of the fall or spring semester pre-service teachers who were taking both Curriculum and Instruction and Instructional Media, they could create a richer experience for pre-service teachers. The following semester they proposed implementation of such a plan and the department agreed to offer one section of the "Block" approach. In the Block approach, the pre-service teachers were enrolled in one 9-credit class that consisted of three distinct courses: Curriculum and Instruction, Instructional Media, and Practicum Field Experience. This cohort approach immersed the pre-service teachers in an integrated study of theory and practice applied in the classroom in the same semester with the bonus of a colleague support-structure. Pre-service teachers who completed this program developed stronger collaboration skills and had more opportunities to instruct in small group and whole class situations than the pre-service teachers who took the three courses at different times with different classmates.

The dual approach (offering one set of Block courses and one set of non-Block courses) was used for two semesters. One result was that pre-service teachers who were in the non-Block classes requested to have an experience similar to their Block counterparts. Additionally, faculty found that the candidates who were in non-Block classes experienced a disconnect between theory and practice, whereas the pre-service teachers in Block classes had the opportunity to make those connections and have them reinforced immediately. Consequently, in fall 2005, two sections of Practicum Block were formed so that all per-service teachers could have the cohort experience. The three courses were no longer offered separately but only as a 9-credit block.

In fall 2006, the University converted from a 3-credit to a 4-credit course standard. Practicum Block was re-evaluated and the current Block was created consisting of 4-credit Curriculum, Instruction, and Assessment, 4-credit Practicum Field Experience, 2-credit Classroom Management, and 2-credit Technology Integration for a total of 12 credits. At the time of the 4-credit conversion, the decision was also made to include community health students concentrating in school health (K-12), thus creating an even richer cohort experience.

With this background, the Secondary/Middle Education Department now had an opportunity to redesign the curriculum more broadly. Combining coursework with a practicum experience would allow pre-service teachers an opportunity to apply their learnings in actual middle and secondary classrooms. The department chose to introduce the learning community model to pre-service teachers in their second year for two reasons: to provide future teachers an early opportunity to experience the professional work environment they would eventually be part of (the professional learning community) and to capture the success of the learning community model to help these young adult learners strengthen their understanding of the teaching profession. Because this group of pre-service teachers would be together in several classes, the decision was made purposely to create a cohort environment. After learning communities and cohorts, the third component of the design was to incorporate authentic learning. The fourth and final component was for every pre-service teacher to have a laptop computer.

The potential for integrating technology into the other courses in the Block allowed for the Technology Integration course to be dropped from 3 credits to 2. The connections among experiences in Block created a 12-credit immersion into what it takes to be a teacher who integrates technology. Faculty felt confident that in order to prepare pre-service teachers for a professional teaching career in the 21st century, it would be imperative that they have a deep understanding of how to integrate technology into their teaching and learning. Therefore, the common thread between all the components of Block became technology integration where pre-service teachers learn and use Web 2.0 tools and immediately integrate them into their unit designs and lessons. The Block is taught by three faculty members who understand the importance of team teaching and the benefits of having the complex theory and skills of being a teacher reinforced across all the Block components.

As these pre-service candidates make the transition from being a student to being a teacher, they are in the unique situation of being able to reflect on their learning as a student and apply it to their teaching. In the three Block courses taught on campus, the pre-service teachers experience technology integration as a learner—they blog their reflections, post artifacts in a wiki, and give presentations and create demonstrations of their learning using technology—and they start to understand the power of integrating technology into teaching and the impact it has on the learner.

What Happens in Block

Curriculum, Instruction and Assessment

In the Curriculum, Instruction and Assessment course, pre-service teachers design a unit in their content area that aligns with Maine Learning Results (MLR) or Common Core State Standards (CCSS) using the *Understanding by Design* model by Wiggins and McTighe (2005), which allows them to "unpack" the goals of either the MLRs or CCSSs depending on their content area. From the standard in the content area, pre-service teachers identify three Understandings and develop three Essential Questions that identify what the students will know and be able to do.

They also identify six higher-order thinking performance indicators for their unit using the Facets of Understanding (explain, interpret, apply, empathy, self-knowledge, and perspective). This becomes the first stage of the unit.

In addition to unpacking the CCSS and MLR standards, pre-service teachers integrate them with the NETS-S. The thread that connects the academic standards with the NETS-S is the strategic use of digital media in the "presentation of knowledge and ideas" which is a vital cluster in the English Language Arts CCSS. The NETS-S require students to demonstrate creativity and innovation, communication and collaboration, research and information fluency, and critical thinking in addition to digital citizenship and understanding of technology operations and concepts. All of the NETS-S skills are critical to students being able to present their knowledge and ideas. Together, the NETS-S and the standards in the Presentation of Knowledge and Ideas cluster help students achieve a desired "capacity of the literate individual" to "use technology and digital media strategically and capably" (CCSSI, 2010).

The second standard for NETS-T is that teachers be able to "design, develop, and evaluate authentic learning experiences and assessment incorporating contemporary tools and resources to maximize content learning in context and to develop the knowledge, skills, and attitudes identified in the NETS·S" (ISTE, 2012b). In Stage 2, pre-service teachers create assessments that will show evidence of learning. They create a performance task that utilizes a Type II Technology (Maddux & Johnson, 2005) as an authentic assessment. They complete an assessment blueprint to validate that they are assessing an Understanding from the MLR or CCSS standards. They create two analytic rubrics, one to assess product and the other to assess presentation of evidence of learning. To assist them in designing a performance task, they utilize GRASPS – goal, role, audience, situation, product/performance, and standard. Referring back to Stage 1, they brainstorm what the evidence of learning will be for all six facets of understanding. They identify the formative and summative assessments they will use when they teach the unit. The artifacts that are created also must utilize a Type II Technology, such as weblogs, wikis, video, digital comics, podcasting, cloud-based timelines, avatar movies, or interactive posters.

The final stage, Stage 3, is where pre-service teachers actually plan the teaching and learning sequence of the unit utilizing the WHERETO's – what/ where/ why, the hook, equip/ explore/ experience, rethink/ rehearse/ revise/ refine, evaluate, tailor, and organize. Once they have outlined the six lessons in Stage 3, the next step is to transfer these into a formal lesson design, using what they have learned in Stages 1, 2, and 3.

Technology Integration

The Technology Integration portion of Block immerses pre-service teachers into using the transformation levels of the SAMR model--modification and redefinition--for their technological knowledge. Pre-service teachers work in teams to research current and emerging technology usage in K-12 classrooms and share their findings with their peers in a digital way. In the summer of 2012, as part of continuous improvement to meet the needs of tomorrow's learners, the teacher education unit (in conjunction with the computer services department at the university) purchased two sets of 20 iPads for pre-service teacher instructors to check out for a week at a time to use in their classes. Fall 2012 was the first semester the devices were available and Secondary/Middle Education was the first department to use them, immersing the pre-service teachers in the experience of learning, evaluating, experimenting, and implementing a new technology.

The Technology Integration portion of Block becomes interdisciplinary when pre-service teachers are required to create a student sample of the performance task using technology in a Type II way and present it before a real-world audience. Additionally, they are expected to transfer their unit performance task from Stage 2 into a WebQuest. The WebQuest model (Dodge, 1999) of introduction, task, process, evaluation, and conclusion aligns well with the GRASPS model (Wiggins & McTighe, 2005). The role, audience, and situation of GRASPS are the very kind of authentic experiences that WebQuests try to achieve as outlined in the task of the WebQuest. The GRASPS standard is the evaluation portion of the WebQuest and utilizes the two analytic rubrics. In the design and creation of the WebQuest, pre-service teachers learn the Web page creation process, write the introduction and conclusion sections, and create the process section by finding and evaluating appropriate online resources.

Learning the "how-tos" of digital tools (how to make a website, how to edit a digital story, how to create a podcast, etc.) and learning the details of using specific software (email, integrated applications (word processing, spreadsheets, presentation software), multimedia applications (audio and video)) is often the focus of technology courses for educators. Practicum Block pre-service teachers learn the details of email, integrated applications, and World Wide Web by using them as required communication tools during the Block experience and they learn the how-tos of digital tools while integrating those digital tools into teaching and learning.

Classroom Management

The Block experience was designed to include theory and techniques of classroom management and provide the opportunity to apply new knowledge in the field experience. The pre-service teachers read and research approaches to classroom management as well as observe their mentor teacher's style of classroom management and interview teachers (their mentor teacher and others) about classroom management techniques. Additionally, the classroom management portion of Block is taught in a way that models good teaching strategies that integrate technology. Pre-service teachers participate in a WebQuest on the Meaningful and Engaged Learning (MEL) Model (Muir, 2001), a theory that incorporates a proactive approach to classroom management. They learn about the MEL model and create a presentation that summarizes their learning using digital audio, video, or comic creation/editing tools. They experience a WebQuest as a learner and its power for teaching with technology before they create their own.

As a class, pre-service teachers brainstorm a list of everything they would like to know about classroom management (and the instructor adds any items that the group may have left out). Then the class sorts and organizes the topics into logical groupings which become the topics for the chapters of a classroom management textbook that is completely researched, written, and taught by pre-service teachers for pre-service teachers. The written portion of the textbook must be presented in a digital way. In prior semesters, pre-service teachers had utilized a wide variety of Web 2.0 tools (wikis, websites, digital scrapbooking tools, etc.) In fall 2012, many of the teams chose to explore e-book authoring tools and create a textbook chapter that would be best viewed on the iPad.

Practicum—Formal Observation

Each semester there are two simultaneous cohorts of Block pre-service teachers being taught by the same three faculty members. During the first two weeks of the semester both Blocks are on campus beginning their studies in Curriculum, Instruction and Assessment; Technology Integration; and Classroom Management. What occurs for the next 12 weeks of the semester are three-week rotations: one cohort group stays on campus for three weeks immersed in the on-campus courses while the other cohort is in the field experience. Pre-service teachers experience full days in a middle or high school classroom on Tuesday, Wednesday, and Thursday where they apply all of the theory and skills from the work they studied in the other sections of Block. Seminars are held on Monday (to prepare for the coming week) and Friday (to debrief the week's experience). These field placements are in schools with one-to-one laptops.

During the first field experience rotation, the field supervisor informally observes the pre-service teachers' interactions with their students and conferences with each one on what was observed and how the pre-service teacher might improve his/her skills. Pre-service teachers also have access to the UMF iPads for a week during this first module. They are able both to explore teaching tools for organization and lesson preparation and to use the iPads as part of their instruction. During the second field experience rotation, pre-service teachers create and deliver a full 80-minute lesson. The field supervisor does a formal observation of the class followed by a conference on what went well and a reflection on areas for improvement. The field supervisor observes how the pre-service teachers integrate technology, apply higher order thinking, use cooperative learning groups, make assessments, and engage students in deep learning and discovery.

Measuring the Success of Technology Integration in the Practicum Block

The common thread among the four design components of the Block experience (learning community, cohort, authentic learning, one-to-one laptops) is technology integration; therefore, the initial research of the effectiveness of the Block experience focused on technology integration. The research questions are: 1. How much confidence can pre-service teachers acquire in their competence to integrate technology into classroom practices? 2. How much growth do pre-service teachers achieve in their technology integration capabilities after one semester of being immersed in the Block experience?

Seven self-report surveys related to various aspects of technology integration are administered pre- and post to the Practicum students to assess the research questions. One of the surveys is the Concerned-Based Adoption Model-Level Of Use (CBAM-LoU) (Griffin & Christensen, 1999) -- a self-assessment instrument adapted from the Concerns-Based Adoption Model Level of Use (Hall, Loucks, Rutherford & Newlove, 1975) to evaluate adoption of an educational innovation. CBAM-LoU "is targeted toward describing behaviors of innovators as they progress through various levels of use - from non-use, to managing, and finally to integrating use of the technology. It does not focus on attitudinal, motivational, or other affective aspects of the user. The concept of levels of use also applies to groups and entire institutions. The instrument is time efficient to use as an indicator of an educator's progress along a technology utilization continuum" (Knezek, et. al., 2000, p. 41). There are 8 levels: non-use, orientation, preparation, mechanical use, routine, refinement, integration, and renewal.

Since fall 2007 when the research was initiated, students have made significant gains in their progress along the technology utilization continuum. Measurable gains in pre-service teacher competence and confidence in technology integration occurred in ten different semesters of the Block experience according to all seven surveys, most of which had an impressive large or very large effect size ranging from 1.44 to 1.96 (Ward & Overall, 2010).

Mentor teachers in the schools with strong pedagogical knowledge are requesting to have pre-service teachers in their classrooms because of the pre-service teachers' strong technology skills. This anecdotal evidence adds confirmation to the consistent growth in both confidence and competence of Block pre-service teachers, which affirms that the Block is a viable and successful model. The quantitative studies show statistically significant gains in both competence and confidence in technology integration skills for future secondary and middle school teachers at UMF. The utilization of the design components from effective adult education (learning community model and cohorts) combined with the authentic learning experience and one-to-one laptops created an effective and powerful opportunity for pre-service teachers to achieve the standards of initial teacher certification and to become competent educators of the 21st century.

Recommendations

Teacher education programs that desire to explore the team-taught cohort model should note that logistical features that have evolved in Practicum have added to its success. When students enroll in Practicum, they are told to reserve 7:30 am to 2:30 pm five days a week for the 12-credit class. They schedule other classes or work after 2:30 or on weekends. This allows the Practicum team the flexibility to schedule classes in blocks, allows students to have a full-day Practicum experience when in the field, and gives students in their learning communities opportunities to meet as teams to work on projects or in study groups. The ubiquitous access to technology is another factor in the success of the team-taught cohort model. Each student having their own laptop is probably the ideal approach; having classes in a computer lab where each student has access to a computer during class time is the next-best approach.

There is great potential for success, even in the early stages of "retooling a traditional training program," but the team that carries it out must be composed of professionals who collaborate and reflect on their teaching (both personally and as a team) and communicate about the students' learning. With such a team in place, improvements can be made on a regular basis that lead to the continuous success of a teacher education program. This team needs to be willing to "restructure the curricular material entirely – so that students have opportunities for deeper understanding of the material they are learning and more interaction with one another and their teachers as fellow participants in the learning enterprise" (Gabelnick, et. al. 1990, p. 19). This team can only be successful if they are part of a department of colleagues willing to support both the team members and the students in the cohort. The Practicum team at UMF meets every week during the semester for at least one hour to coordinate the three classes, fine tune lessons, and insure that students see relationships and make connections between classes. They provide "both the challenge that encourage[s] learners to grow and the support they [need] to meet those challenges" (Drago-Severson, et. al. 2001, p. 16).

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