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Pennsylvania ASCD…

Educators impacting teaching and learning through leadership.

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Table of Contents

Pennsylvania Educational Leadership

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Foreword

The articles in this issue of *Pennsylvania Education Leadership* promote the stated mission of the organization, which is **Educators impacting teaching and learning through leadership.** Specifically, this issue focuses on educational research as a basis for impacting teaching and learning in both the P-12 and higher education arenas.

In the lead article *Kausalai Kay Wijekumar and Vito A. Forlenza* promote the bridging of the research-practice gap through sensible consumption of educational research. They identify four areas to guide review of research and share resources available to assist educators in these areas.

Peter G. Pavlis, author of the second article, describes his research study to investigate the impact of inquiry-based science instructional practices on student achievement on high-stakes tests. He reviews the research literature, shares his research design and discusses the implications of his research findings for science classrooms.

In the third article, *Darlene Schoenly* advocates for a balanced framework for literacy instruction, derived from educational research. The author describes the framework in four key instructional areas: explicit, systematic, mindful and contextualized.

The fourth article chronicles a school district's efforts to build a model for inclusive transition program planning. *Donna Monturo* reports on how the model was defined by and evaluated in terms of educational research.

The final article, by *Dawn Detruf Turkovich and Kristin R. Hardy,* emphasizes action research as a method for improving practice. The authors describe how they developed and implemented an action research study to find a way to promote preservice teachers' transfer of knowledge across courses within the college and ultimately into practice.

We hope that you find the articles to be stimulating reading. Feel free to contact the authors about their work and ideas. If you have an idea for an article, please submit it for consideration.

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Education Practitioners' Sensible Consumption of Research

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Never before has credible research been available to education practitioners as is now the case, and never before has it been so important for education practitioners to bridge research to policy and practice. With evidence-based findings accumulating on needs-sensed topics from some of the most trustworthy sources, education practitioners' consumption of such research is now challenged with using the information to improve schooling practices that purport to increase student learning.

This challenge is magnified further since the research often is written and packaged by researchers specifically for practitioners, disseminated within reach of local educators in a variety of venues, accessible with the click of a mouse, and obtainable through technical assistance from education service agencies, higher education, and from the 10 regional educational laboratories across the country (http://ies.ed.gov/ncee/edlabs/).

Given this progress, combined with the increasing necessity for research to guide practice, this article calls attention to factors and their related measures and notions that can be central to education practitioners' sensible consumption of research.

Highlighting the view that research provides ideas, suggestions, and challenges but not answers, education practitioners have a responsibility to evaluate research in at least four *interrelated* areas. They are: (1) research credibility; (2) local capacity; (3) suitability to placed-based contextual underpinnings; and (4) professional development designs that enable capacity building.

Factor 1: Determining Research Credibility

Education practitioners need to be able to discern research that is worthy of consideration. Davis (2007) considers this a most important matter as to practitioners' judgments of what research to pay attention to and what to ignore.

Levels of Evidence/Effectiveness

First, consumers of research should be concerned with the levels of evidence and not limit themselves to levels of effectiveness or findings on a particular topic. That is, the accumulation of scientific knowledge that provides a road map over time is a good place to begin (Shavelson & Towne, 2002). Guidelines for levels of evidence put forth by the What Works Clearinghouse (WWC) (http://ies.ed.gov/ncee/wcc) offer insight for practitioners to get started.

Careful review of levels of evidence has resulted in 14 practice guides on a variety of topics accompanied by the levels of evidence for each recommendation that appears in each document. The levels of evidence categories are (1) strong, (2) moderate, and (3) minimal with

corresponding descriptors. Written by a panel of experts for education practitioners, this should be one of the first checkpoints in discerning research quality. This most credible source identifies research that brings the best available evidence and expertise on current educational challenges. To that end, when education practitioners are faced with curricular choices, they may need to conduct a careful review of the levels of evidence themselves using approaches similar to those applied by WWC in the practice guides.

Unfortunately, there continues to be a dearth of reports on educational interventions that have only one or two well-designed and implemented research studies. In these situations, practitioners should weigh the levels of effectiveness within the context of the research itself to make more informed decisions. These types of interventions would most likely be categorized as falling within or below the minimal ratings discussed above. Not to be discouraged, practitioners must monitor carefully the introduction of these types of interventions, such as through the prototyping construct explained below, and follow any new research that becomes available throughout their implementation.

The theme of this article is clear. That is, the sensible consumption of research by local education practitioners is the most important variable in deciding implementation of interventions. Nevertheless, this involves gathering as much information as possible from reputable sources prior to implementation. Two such sources, *Find What Works* and *Newsflash*, are explained in the following paragraphs.

In addition to the practice guides, WWC offers *Find What Works* (http://ies.ed.gov/ncee/reports/advancedss.aspx/) with reference to programs, practices, and policies that address local school and district needs accompanied by levels of effectiveness summaries. With reference to local needs, the effectiveness of more than 100 researched interventions can be accessed and customized by grade level, subject area, delivery method, extent of evidence, and other characteristics.

Another dependable source for recognizing research quality and appropriateness and assisting in drawing appropriate findings from research is *Newsflash* (http://ies.ed.gov/newsflash/) offered through the Institute of Education Sciences (IES). *Newsflash* is an email-based alert service designed to inform educators on news and information about new content and recent research posted to the IES website and across its four Centers (National Center for Education Evaluation (NCEE), National Center for Education Research (NCER), National Center for Education Statistics (NCES), National Center for Special Education Research (NCSER) and programs within those Centers, such as the Regional Educational Laboratory program mentioned above.

Bias

A second test that can be helpful when searching for research credibility deals with bias. For the purpose of this article, bias comes in at least two forms—research bias and personal bias.

Research bias is concerned with which organization financed and who conducted the research. Education practitioners would be well served to look for research that has been funded and conducted by an unbiased third party. Related to self-enhancement bias, as explained by Pfeffer and Sutton (2006), the less proximate involvement in a program or activity by the funding agency and principal investigators, one can expect more objective reports and scientifically-based methodological designs.

Research bias also surfaces with reference to research design. For example, bias is more controlled where participants are assigned to treatment and control groups in randomized control trials (RCT). Additionally, generalizing to the wider population provides greater credence when random sampling is used, sample sizes are large and are representative of a cross-section of participants and schools rather from a cluster of people and schools within one geographic area. Most of the recently published RCTs include a volunteer sample of schools and use the stronger random assignment approach that provides a sound research design but still cannot be generalized beyond the population in the study (Bloom, 2005; Shavelson & Towne, 2002; Boruch, 1997). In reviewing these studies, practitioners should attend to population descriptors, such as the number of students receiving free and/or reduced lunch, per pupil expenditure, and student-teacher ratios to gauge how similar their own schools are to the population in question.

Schooling is highly value laden (Shavelson & Towne, 2002) and subject to personal bias. In such an environment, everyone has opinions, such as homework or grade retenton, which often sound commonsensical and obvious to effective schooling practices. To help control for personal bias, education practitioners should be reminded that people tend to: (1) imitate what they saw that was working well regardless of the circumstances; (2) copy the most visible and obvious practices (Pfeffer & Sutton 2006); and (3) pay greater attention to research that confirms their deeply held beliefs (Davis, 2007). As such, it is not uncommon for principals and teachers to mimic success stories from newspaper accounts or peers' self-reporting experiences from memory or locally developed questionnaires and interviews in neighboring school districts in the absence of any credible evidence to back up these claims. In helping to control for personal biases, Pfeffer and Sutton (2006) suggest looking for failures in success stories and successes in failure stories by inviting educators from different parts of an organization to weigh in on the data being deliberated. With outside facilitators to control for insider bias, education practitioners should work in community of practice teams of unlike minds to examine research as they attempt to discern between research that is worthy of consideration and that which is not (Wenger, McDermott, & Snyder, 2002).

Factor II: Assessing Local Capacity

District/School Capacity

District and school capacity to support applications of research is another critical aspect of practitioners' sensible consumption of research. Given the rhythms of the school day and year, Davis (2007) and Miller, Drill, & Behrstock (2010) remind us that education practitioners want to know what works and how to go about fixing things now in response to pressing concerns oftentimes at the advice of so-called local experts. To be fair, this imprudence is further exacerbated by high stakes testing environments coupled with sanctions with which public educators currently find themselves. Notwithstanding, implementation of research labeled as "what works" without any semblance to what the local traffic is able to bear can make things worse systemically no matter what the levels of evidence. To be sure, an overt attempt at ascertaining capacity to plan for implementation that makes sense locally relative to roles and responsibilities at the district and school levels is imperative.

Potential Roadblocks/Suggested Solutions Approach

Once again, the WWC practice guide series offers insight on establishing strategies to determine district and school capacity. With each recommendation in a practice guide, potential roadblocks accompanied by suggested solutions ease one's development of a respectful skepticism when examining local capacity. For example, in the practice guide *Developing*

Effective Fractions Instruction for Kindergarten Through 8th Grade, there are five recommendations. The fifth states, "Professional development programs should place a high priority on improving teachers' understanding of fractions and how to teach them" (Siegler, Carpenter, Fennell, Geary, Lewis, Okamoto, Thompson, & Wray, 2010, p. 42).

Three potential roadblocks with implications for money, local culture, content, instruction, and teacher expertise are listed with detailed explanations and suggested solutions that relate to district and school levels.

Consider potential roadblock 5.1. "Administrators and professional development personnel might argue that the topic of fractions is just one of many that elementary and middle school teachers must be prepared to teach and that their district (mathematics) program, or school cannot devote more time or resources to it" (Siegler, et al., p. 45). To assess local capacity relative to this roadblock, some questions that come to mind might be:

- Can ample time be devoted at the school level for professional development to fractions?
- Are adequate financial resources available to provide quality professional development to fractions?
- To what extent are the teachers at these grade levels prepared to teach fractions given this research?

Unfortunately, research worthy of consideration will not always be packaged so appropriately for practitioners as found in the practice guide series. Nonetheless, practitioners are encouraged to follow the practice guide strategy of ferreting out core recommendations and generating potential roadblocks and suggested solutions to assess local capacity. To get started, the following questions might be helpful:

- What implications for practice does this research present to us?
- What surprised us about this research?
- What are some challenges we are likely to face by implementing this research?
- What questions do we still have about this research?

Using the community of practice team framework (Wenger, et al., 2002), central office and building level educators can use this procedure to scrutinize research, brainstorm challenging questions, and see possible solutions in relation to the local situation. Such a strategy would be similar to the suggestion of Pfeffer and Sutton (2006), i.e., failure embedded in success and success embedded in failure. More to the point, the potential roadblocks/suggested solutions strategy has utility to assess readiness and any cascading effects of acting on research while calling attention to "on the ground" conditions when moving the implementation process forward or seeking other research more accommodating to local situations. Thus, quantitative data rarely generalize to the real world, the right questions have to be asked (Lehrer, 2009).

Factor III: Paying Attention to Context

Emerging Practice in Context

Translating research into practice is never straightforward. Each district and every school within a district has a unique culture that influences results and serves up needs in a myriad of ways. The uniqueness of students, staff, families, and communities creates dynamic interactions that cannot be understood from afar. So the emergence of new practice is more likely when coherent with the local context. To be sure, applying research ideas to practice is a continuous

journey that involves changes in practitioners' beliefs and procedural skills (Shavelson & Towne, 2002). School personnel consult their local colleagues more often than seeking outside assistance or research to guide practice. To that end, commitment follows competency that is assented from the local community, not robotic replications of strategies from another school regardless of its success. Cautioning practitioners that context matters, Capra (2002) summarizes the pitfalls of chasing replications:

> In human organizations, emergent solutions are created within the context of a particular organizational culture, and generally cannot be transferred to another organization with a different culture. This tends to be a big problem for business leaders who, naturally, are very keen on replicating successful organizational change (p.119).

Capra (2002) goes on to say that the change process is continuous and nonlinear involving many feedback loops; unfortunately, leaders are quick to replicate new structures that have been successful elsewhere.

Placed-Based Context

The nonlinear process of determining research credibility (Factor I) and assessing local capacity (Factor II) is sensitive to assessing the conditions and circumstances of the times (Gladwell, 2000) in local context. Throughout this "slow knowing" design (Claxton, 1997), an increasing reality of placed-base context and complexity unfolds. Gradually, this new reality allows for picturing an emerging future as to the people, tools, and resources desirable to act in harmony with it in dealing with set-backs that are inevitable to draw out new patterns of practice (Shavelson & Towne, 2002; Fullan, 2001).

Elmore (2004) tells us that learning in one's place is more important than individuals' knowledge or skills no matter how well meaning they might be. Expanding on Elmore's insights, Fullan (2001) drives home the point that learning *is* the work:

> ….learning in the setting where you work, or learning in context, is the learning with the greatest payoff because it is more customized to the situation and it is social. Learning in context is developing leadership and improving the organization as you go. Such learning changes the individual and the context simultaneously (p. 126).

These understandings have more than a few implications for bridging research to practice. First, they make it clear that chasing and trying to replicate "best practices" from schools across the street, across the river, across the state, or across the country without regard to how it might play out locally is probably a waste of time and usually make things worse. Second, slowly gaining an appreciation for the conditions and circumstances locally relative to the core ideas of research prior to implementation is likely to pay huge dividends. Third, research does not provide answers but it does provide sound principles that will look different from place to place. Fourth, people are just as or more important than programs or strategies. Fifth, and the final theme of this article, new patterns of practice emerge from front line workers who work with research seamlessly on the job.

A trustworthy resource relative to practitioners' sensible consumption of research and especially how education practitioners from different schools have contextualized the same interventions is the Doing What Works (DWW) website (http://dww.ed.gov). The mission of DWW is to translate research-based practices into practical application tools for classroom

instruction. Constantly evolving as new research becomes available, DWW currently contains six research areas across which 17 interventions are featured. Content for each intervention is organized into four areas: (1) practice summary; (2) learn what works; (3) see what works; and (4) do what works. Following the links for any intervention uncovers specific recommendations that education practitioners have implemented. Implementation efforts are explained in print, video, and offer hands-on tools that are readily available for use. In short, DWW houses a wealth of resources to assist practitioners with the sensible consumption of research and in keeping current as new research becomes available.

At the state level, the Pennsylvania Department of Education (PDE) has created the Standards Aligned System (SAS) website designed to bridge research and practice. Through the coherence of six elements (standards, assessment, curriculum framework, instruction, materials & resources, and safe & supportive schools) that spotlight student achievement, Pennsylvania's SAS purports to be:

> a collaborative product of research and good practice that identifies six distinct elements which, if utilized together, will provide schools and districts a common framework for continuous school and district enhancement and improvement (SAS, 2012).

Organized to provide education practitioners with directions to consider relative to these six elements, the big ideas are a synthesis of research at a broad level. The big ideas do not incorporate specific new research studies or links to credible education research for further review. Albeit a helpful tool for practitioners, finding and using the most current and credible research are not components of Pennsylvania's SAS website. Nonetheless, SAS, when used in combination with the resources and suggestion outlined in this manuscript, can be a sound approach to the school improvement journey.

Factor IV: Self-Organizing Capacity Building

Job-Embedded Professional Development

Notwithstanding the intervention targeted for implementation, slowly enabling capacity building through job-embedded professional development and action research is paramount to meaningful and sustained change. Action research can be a form of job-embedded professional development that contributes to continual learning and progressive problem solving (Riel, 2010).

Oftentimes this is overlooked for at least three reasons. First, there is the sense that the new structure has to be implemented quickly. Second, job-embedded professional development or action research is a monumental paradigm shift and not on the radar screen of many practitioners. Third, several days, in the name of training, are set aside to furnish front line workers with the information needed to turn information into action—implementation is easy for those who don't have to do it. This section deals with the third observation as the other two are addressed above.

Formal training programs are ineffective (Fullan, 2008) (Pfeffer & Sutton, 2000). There is no doubt that findings or principles from research must be communicated to those closest to the students. Nonetheless, the local expert or researcher who usually imparts this information does not have an appreciation for the rhythms of the school day and year nor the messiness of classroom life. Judgment and discretion, two variables necessary for contextualizing research findings to generate new patterns of practice, are products of examining decisions from real life experiences in the middle of the action—not from presentations of carefully controlled

experiments (Brown & Duguid, 2002) (Shore, 2008). To that end, central office personnel must set the conditions for principals and teachers to reconcile the worlds of principle and practice on the job without compromising the fidelity of the research implementation.

Prototyping

Detailed planning for implementing new structures pays marginal dividends at best as no plan survives contact with the ground (Heath & Heath, 2007). Yes, planning forces people to think through important issues to get to the core idea of an intervention (Heath & Heath, 2007)—but strategic plans and vision or mission statements cannot predict the unceasing events that will unfold in practice where incidental learning opportunities need to be pondered and captured in context. Fullan (1993) observes this as a 'ready, fire, aim' mindset that is more rewarding for an organization where:

> Ready is important, there has to be some notion of direction, but it is killing to bog down the process with vision, mission, and strategic planning, before you know enough about dynamic reality. Fire is action and inquiry where skills, clarity, and learning are fostered. Aim is crystallizing new beliefs…. (p. 31).

Ready-fire-aim prototyping is a self-organizing construct that builds placed-based capacity seamlessly embedded in the job. With a cadre of front line workers within and across grade levels, schools, and, at times, subject areas, implementation begins on a smaller scale in community of practice teams.

Senge, Scharner, Jaworski, and Flowers (2004) say it best:

> Prototyping is modeling or simulating your best current understandings… that enable communication among people with very different discipline bases…..until you get to some desired outcome, which you could not have predicted in the beginning (Senge, et al., p.147).

Thus, prototyping is not about focused plans or innovation but about improvisation and dialogue to create and generate new patterns of practice where the people who make up the cadre *are* the prototypes, i.e., they act their way into thinking differently. Senge, et al., (2004) continue:

> Effective prototyping requires the capacity to stay connected and grounded in your deepest source of inspiration and larger will while simultaneously learning to listen to all of the feedback your actions elicit....feedback will give helpful clues about how to shape, mold, and concretize what is beginning to form—but only if you learn to listen and set aside your negative reactions to "not getting it right" from the outset. (p.148).

Closing the Knowing-Doing Gap

Working in social networks (Cross & Parker, 2004) and community of practice teams (Wenger et al., 2002) over the course of a year or so, the cadre of practitioners work at closing the knowing-doing gap (Pfeffer & Sutton, 2000) through job-embedded prototyping. Underscored by improvisation and dialogue, these front line workers use discretion and judgment in contextualizing the research with placed-based fidelity by building tacit knowledge through practice, performance, and failure. Pfeffer and Sutton (2000) emphasize that by embedding the acquiring of new knowledge in the actual doing, rather than vicariously through meetings and

presentations, the cadre has begun to close the knowing-doing gap and is primed to facilitate the spread of new patterns of practice to colleagues using the same process.

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The Frequency of Inquiry-Based Instruction and Its Effect on Students' Achievement on High Stakes Tests

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Introduction

Standardized testing has been around since the 1850s (Longo, 2010). At first, these tests were developed to help teachers, school administrators, and public officials find out more about the learning process and to determine how our nation's schools were doing. Later, information from high-stakes tests was used to help keep schools accountable in order to receive funding. Now, testing is driving instruction (Longo, 2010). These tests will have a greater effect on accountability, as students may need to pass standardized tests in order to pass their science courses. Science teachers must prepare their students to be successful in these critical-thinking tests, which involve more open-ended and problem-solving questions. Teachers need to consider inquiry-based instruction and how these instructional practices can improve students' ability to think critically.

Inquiry-based instruction in science education focuses on student-constructed learning as opposed to teacher-transmitted information (Longo, 2010). Because students are building their own understanding of science and their critical-thinking skills concurrently, they need a great deal of practice to develop these latter abilities. Critical-thinking practice should, theoretically, help students to become proficient in analyzing science problems (Cohen and Hill, 2001). High-stakes tests measure the critical-thinking ability of students and the students' ability to construct meaningful answers to problems (Cohen and Hill, 2001). The more teachers challenge their students to solve problems in the classroom, the better students will develop the ability to answer open-ended questions in a standardized assessment (Resnick and Resnick, 1992). Finally, in an inquiry-based curriculum, the students are engaged in their learning, and students who are engaged in their learning will have the opportunity to develop their critical-thinking skills (Wideen, 1997).

Literature review

Science is more than just the content knowledge that has been learned through time; it is an exciting, problem-solving, and engaging process of obtaining knowledge through inquiry. Inquiry-based instruction begins with a curriculum that is standards-based, including the ability to engage in the practice of science. Second, the curriculum includes assessments with open-ended questions that will reflect student proficiency not only in content knowledge but also show proficiency in the ability to use critical thinking skills to solve every day problems. Finally, the curriculum includes lessons that give students frequent opportunities to practice those critical thinking skills.

Standards: Desired Goals for the Teacher

The whole science concept of content knowledge and an understanding of the scientific process are evident in the National Standards of Science Education. In chapter 6 of the NSES, the standards state that students should have an "understanding of 'how we know' what we know in

science" (National Research Council, 1996, 105). These standards state that the "students should learn how to combine both the content knowledge that they learn and the process of science to have a complete understanding of science" (National Research Council, 1996, 105). The standards emphasize that all "students should have the opportunity to partake in the process of inquiry, which is the ability to observe different phenomena, to make inferences about the phenomena, and to test those inferences by experimentation" (National Research Council, 1996, 105). Further, the standards state "students should have the ability to think and act in ways of inquiry" (p.105). The skills that "students need to develop include: asking questions, planning and conducting investigations, using appropriate tools and techniques to gather data, thinking critically and logically about relationships between evidence and explanations, constructing and analyzing alternative explanations and communicate scientific arguments" (National Research Council, 1996, 105).

As science educators, we are legally responsible to teach to these national standards and to individual state standards that are based on the national science standards. These standards drive what we teach in the classroom, both in the content and in the skills to conduct further investigations as the students learn about their world. Additionally, the No Child Left Behind Law of 2002 has placed more accountability on schools to close the achievement gaps within schools, especially those with minority or disadvantaged students (NCLB, 2002).

To make sure that national and state standards were being implemented on a local level, teacher support was imperative to ensure that local curricula supported these standards (Cohen and Hill, 2001). Researchers surveyed teachers about the new state standards. In the survey, the teachers stated that the standards matched their goals to help students learn critical-thinking science skills (Cohen and Hill, 2001). The teachers were given opportunities to implement new curricula that matched the state's goals as well as their own. When teachers implemented these new curricula, the test scores improved (Cohen and Hill, 2001). Resnick and Resnick (1992) stated that teachers must teach to a desired standard to help students achieve proficiency in the standard. Everything the teacher does in the classroom must give students the opportunity to develop those important critical-thinking skills. Teachers must allow the students many opportunities to answer science questions so that students can construct meaningful answers by making logical connections to the available evidence (Chinn and Malhotra, 2002). In addition, students need frequent opportunities to construct and plan investigations, to use appropriate tools to develop data, and to present a scientific argument (Chinn and Malhotra, 2002). An inquiry-based curriculum will give teachers the opportunity to achieve these goals in the classroom on a daily basis (Longo, 2010)

Many state standardized science tests are designed to show evidence of how well students have achieved the states' goals or science standards (Hammerman, 2005), including those critical-thinking standards. The states designed these tests intentionally to reform educational practices in schools (Popham, 1985). This measurement-driven instruction was meant to influence teachers to reform their curriculum to include scientifically proven methods of instruction in the classroom (Resnick and Resnick, 1992). Resnick and Resnick (1992) emphasized that the tests are an economical way for the states to make sure local schools are aligning their local curriculum to the standards, so the curricula could include teaching methods to develop critical-thinking skills.

Assessments: The Ability to Answer Open-Ended Questions

One way measurement-driven instruction has changed educational practices is to change the test format of standardized tests. The test format of these assessments has evolved from simple multiple-choice questions to more authentic and open–ended questions to show more of the

students' thinking ability (Cohen and Hill, 2001). For example, in 1994, California state assessments became connected to the newly formed state standards, not to the textbook standards (Cohen and Hill, 2001). To understand what the students were thinking, the assessments have been improved to match the level of the reformed state standards. More open-ended questions were used to test students' critical thinking, not just basic concept skills.

Since standardized testing includes more open-ended questions, teachers need to provide practice with more critical-thinking questions to enhance student learning and at the same time help students to do well in the standardized testing. Hammerman (2005) stated "Classroom assessments can be used to monitor, diagnose and enhance student learning" (p.29). One type of assessment is formative. These assessments can assist teachers in gathering information about their students' learning on a certain topic. These assessments can take many forms from just a simple question asked by the teacher to the students or the teacher giving the students a set of questions to answer. Teachers can use this information to change the instructional method to meet the needs of the students. In addition, students are given teacher feedback on these formative assessments to help them construct their explanations with correctness and clarity. Students did better on standardized assessments when taught by teachers who frequently used hands-on learning, critical-thinking activities, and teacher developed formative assessments in their curriculum (Hammerman, 2005). Students who designed their own experiments during inquiry-based instruction not only mastered all the content but received the highest scores in their formative assessments (Longo, 2010).

Resnick and Resnick (1992) also recommended that inquiry-based curriculum with assessments that include open-ended questions should be incorporated into all subjects across the board in the K-12 curricula to give students opportunities to develop the ability to answer open-ended questions with proficiency. In a 1997 study, middle school science teachers incorporated this inquiry-based curriculum into their classroom instruction (Enger, 1997). In this study, Enger investigated to see if the intervention of classroom instruction, using open-ended questions with middle school students, had any effect on those students' ability to answer open- ended science questions on a standardized test, subsequently given to the same students in their ninth grade year. During their middle school science instruction (6^{th} -8^{th} grades), these students had instruction in setting up data tables, graphing numbers, writing down their own observations from an experiment, and making predictions about what will happen in their experiments. When these students were surveyed about their instruction in middle school science classes, most of them stated that they had a great deal of instruction in dealing with open-ended questions. As for the results on the standardized test given to ninth grade students, the students had trouble with the clarity of their explanations and drawing inferences from the given information. The students had trouble transferring the ability to infer what they learned to other problems. This intervention of teaching the ability to answer open-ended questions had little effect on the students' ability to answer the open-ended questions on a standardized test. These open-ended questions gave the teachers a great deal of insight into the misconceptions that students may have in developing their explanations to these questions (Enger, 1997).

Abbott and Warfield (1999) studied another instructional intervention to help students in their ability to complete open-ended questions in standardized tests. They wanted to find out if teaching directly about how to solve problems would help students with these open-ended questions. High school teachers instructed their students in the ability to problem solve. The problem-solving course consisted of three areas: cooperative learning, multiple intelligences and a problem-solving method. During a 15-week period, students had direct instruction in cooperative learning in which students worked together to achieve higher results. What made these groups different from regular student group work was that students were assigned roles to help the group

succeed. They also received instruction on multiple intelligences to help students see that there were other ways to solve problems, allowing students to observe other students' strengths that might differ from their own. Finally, students were taught a problem-solving method that consisted of three parts: first, to investigate new information; next, to use the new knowledge to make decisions; and finally, to work with others to solve problems. Before students participated in the 15-week course, they had to answer a questionnaire based on their ability and confidence to solve problems and complete a standardized test with open-ended questions. After the 15-week course, the students were given the same survey and the same standardized test. The students showed more confidence in their ability to solve problems and their test scores increased slightly. The authors concluded that students must learn and practice problem-solving skills in schools. Schools should have curricula in place to help promote the practice of such thinking skills (Abbott and Warfield, 1999). For students to develop this process of thinking or the ability to explain concepts, they must be practiced over and over again and be used in many different situations as they go through their K-12 education (Resnick and Resnick, 1992).

To give students adequate practice in open-ended questions, teachers must have an adequate supply of these questions for their assessments. Popham (1985) stated that these open-ended assessment questions are very difficult to construct because the questions need to be clearly stated and fit the appropriate standards. Vendlinski, Nagashima, and Herman (2007) wanted to see if teachers could improve their development of these open-ended questions by collaborating with peers. The authors carried out their study to find out if teachers could collaborate in developing good questions for a science benchmark test. The study used three groups of teachers and other educational professionals. Each of the groups worked on a separate science unit. The questions went through detailed processes of being analyzed and tested. After the detailed pilot testing, the results of the study showed that teachers had no problem developing multiple choice or open-ended questions for the benchmark tests with collaborative assistance by other teachers and professionals. It was important to note that the questions were developed based on the instructional goals of each of the units and the teacher-developed questions had a clear prompt that was used to assess the students' knowledge as well as their higher-order thinking.

In addition to test format, other factors in standardized test preparation would be teacher beliefs about standardized testing and state instructional support for teachers. A study, conducted by Firestone, Monfils and Schorr (2004), found that standardized testing affected the way teachers prepared students for the tests. In this study, a three-year survey was conducted along with classroom observations and interviews with teachers in the state. The study found that teachers were preparing their students for the standardized testing in two different ways. As a state-test advocate, the teacher took a more didactic approach to instruction, making sure students had an opportunity to learn the material. On the other hand, if the teacher was against state tests, the teacher incorporated more of an inquiry approach with open-ended questions to guide instruction. Additionally, all the teachers in the Firestone, Monfils and Schorr (2004) study mentioned "the importance of support in terms of materials, curricular assistance and learning opportunities" (p.80). The teachers mentioned how difficult it would be to buy a new program to help student learning; however, it was easy to obtain materials associated with the state-testing program. The state provided materials to help teachers actively engage students with hands-on learning. Other state-offered assistance programs mentioned by the teachers were curricular reform and opportunities for teachers to learn about new instructional approaches implied by the state standards. Teachers who received support from school administrators and the state were more apt to use inquiry-based instruction than didactic instruction (Firestone, Monfils and Schorr, 2004). Resnick and Resnick (1992) indicated states should support this Measurement-Driven Instruction by providing teachers instructional materials, additional help, and state guidelines for student success in the standardized tests. Most importantly, teachers collaborated to implement these new instructional practices. In conclusion, the study showed that testing caused

teachers to explore more cognitively challenging, inquiry-based, instructional tasks (Firestone, Monfils and Schorr, 2004).

Early attempts to implement inquiry-based instructional practice failed because teachers did not have a clear understanding of the link between standardized assessments and the standards. Each of the test items was constructed so that each has a direct link to more than one of the standards (Hammerman, 2005). For example, Widen and O'Shea (1997) found that teachers in two British Columbia school districts tended to teach more through direct instruction than inquiry-based instruction as the students approached 12th grade to take their exit exam. The researchers studied 8th, 10th and 12th grade teachers over a two-year period. They interviewed and observed the lessons the teachers taught in their classrooms. The results showed that 8th and 10th grade teachers were willing to use more inquiry-based instruction, while the 12th grade teachers used more direct instruction. Some teachers even admitted that they did not let students explore as much in 12th grade because they wanted the students to do well in their exit exams. Teachers also admitted to narrowing their scope of what was taught in the course to cover just the content standards that would be on the test (Widen, 1997).

Instruction: Developing and Practicing Critical Thinking Skills

The missing piece of the puzzle is the rich and creative components of effective and frequent instruction to make sure that students are learning the science process in the classroom (Longo, 2010). The students need to have inquiry-based lessons that include practice in observations, opportunities in research, practice in developing thoughtful conclusions and understandings (Hammerman, 2005). Students must take responsibility for the problems they solve. In the constructivist approach, the teacher is the guide to student learning (Longo, 2010). As teachers learn more about and believe in these critical-thinking instructional practices, students will have many more opportunities to increase their science learning because they will be synthesizing their own information through the process of observation, reflecting on data, and providing logical conclusions based on the evidence (Hammerman, 2005).

Effective science instruction is based on an authentic approach to science teaching, a constructivist view on how students learn science, and many opportunities for active learning (Wideen et al., 1997). First, authentic science inquiry approach is giving students an opportunity to carry out research that scientists would perform (Chinn and Malhotra, 2000). Most students conduct simple textbook experiments that measure how a dependent variable changes as an independent variable changes. These simple practices can give a false impression of the process of science. In an authentic learning experience, students are given the opportunity to select their problem just like a scientist and to complete the scientific process. Most textbook activities do not include these types of authentic activities (Chinn and Malhotra, 2000). Research-based activities that are constructed by educational researchers include more hands-on activities and tasks that evaluate data presented in research reports (Chinn and Malhotra, 2000).

The last two components of effective science teaching are active learning and the constructivist viewpoint of how students learn science. According to Huber and Moore (2001), these two aspects are connected for a good inquiry-based lesson because not all hands-on learning would also be a good inquiry-based lesson. In an inquiry-based lesson, students must be actively engaged in their learning in order to build their knowledge of how scientists actually learn about the happenings of their world.

Purpose of this Investigation

According to the research in this literature review, all indicators pointed to a positive connection between the science standards and inquiry-based instruction. However, there was a need to further the empirical research on the effect that inquiry-based instruction has on the students' ability to succeed on standardized testing, because there has not been sufficient research to show how inquiry-based instructional methods may be connected to student performance on state standardized tests (Longo, 2010). As measurement-driven instruction drives local school districts to make decisions about their instructional practices, teachers needed more evidence to show that frequent use of inquiry-based instruction can help students do well on standardized testing. This investigation provided one more piece of evidence to substantiate that inquiry-based instruction has positive impacts on students' standardized test scores, which, in turn, should show student mastery of the science standards.

In this investigation, the instructional methods of science teachers in two groups of Pennsylvania high schools were compared. One of the groups of high schools was selected for significantly higher scores on the 11th grade science Pennsylvania System of School Assessments (hereafter referred to as PSSA). The second group of high schools had significantly lower scores in the same tests. A teacher survey was prepared and sent to science teachers in both schools, asking them how frequently they use inquiry-based instruction in their classroom. From the analysis of the surveys, I attempted to determine whether or not science teachers in a group of high schools with significant success in 11th grade science Pennsylvania System of School Assessments more frequently used inquiry-based instruction as compared to those in the lower-performing schools.

Method

Participants and Design

I began by selecting test schools to complete the survey. The PSSA website (Pennsylvania Department of Education, 2011) provided the data for the selection process. The website contained 11th grade PSSA science scores from all the Pennsylvania high schools. For this study, the data from years 2008, 2009, and 2010 were used. Two lists of the schools were compiled, one for high schools that achieved high scores for all three years and another list for high schools that achieved low scores for all three years. Scores were determined by the percent of students who achieved an advanced or a proficient score in the science PSSA. "High scores" were defined as when 60% or higher of the students taking the test received an advanced or proficient score, while "low scores" were defined when 30% or lower of the students taking the test received an advanced or proficient score.

After the two preliminary lists were compiled, additional data were compiled from the same PSSA website concerning students who were economically disadvantaged for both lists of schools. Based on this information, three pairs of schools were selected. Each pair included a school with high success in the 11th grade science PSSA and a school with low success but both schools in each pair had similar percentages of students who were economically disadvantaged. Next, the *School Matters* website (Council of Chief State Officers, 2011) was used to control other variables such as ethnic diversity, student-teacher ratios, and the location of the school. Each pair of schools was controlled for these other variables so that each school had a similar ethnic diversity in their student body, had similar student-teacher ratios, and had similar locations, such as rural, suburban or urban.

After the three pairs of test schools were selected, a survey was sent to science teachers in each school. Teachers were instructed not to place any names or other identifying information on the survey. After completing the survey, they were to return the surveys to the researcher in self-addressed stamped envelopes to ensure anonymity. To make sure that data could be analyzed and categorized correctly, each school received surveys that were printed on different colored paper in order to group them by participating school.

Results

Several independent measures t-tests were conducted to assess whether high-achieving schools and low achieving schools differed in terms of how frequently (where 1 = *never* and 5 = *more than five times/month*) teachers a) used open-ended questions for assessments, b) provided appropriate tools , c) engaged students in data-taking, d) had students create data tables, e) had students work in cooperative groups, f) had students work in groups, g) allowed students to use data to support explanations, h) provided guided questions to develop conclusions, i) constructed personal explanations of data, j) orally explained evidence, k) allowed students to research information to develop an hypothesis, l) allowed students to make observations, m) allowed students to create questions, n) allowed students to plan investigations, and o) allowed students to design experiments. The critical data for each test can be seen in Table 1.

Table 1. Descriptive and Inferential Statistics for Participants' Self-Reported Use of Various Inquiry-Based Learning Activities, as a Function of a School's Achievement in PSSA Scores

Classroom Activity	School Grouping	*M*	*SD*	*t*	*p*	η^2
Open-ended Questions	High-achieving	4.22	1.17	2.38	.023	.142
	Low-achieving	3.22	1.35			
Appropriate Tools	High-achieving	3.72	1.13	.66	.513	.013
	Low-achieving	3.44	1.38			
Data-Taking	High-achieving	3.61	1.04	1.32	.196	.049
	Low-achieving	3.11	1.23			
Create Data Tables	High-achieving	2.72	1.17	2.66	.012	.173
	Low-achieving	1.83	.786			
Cooperative Groups	High-achieving	3.83	1.50	.233	.825	.001
	Low-achieving	3.72	1.49			
Groups	High-achieving	4.17	1.34	.504	.617	.007
	Low-achieving	3.94	1.30			
Data to Support Explanations	High-achieving	3.94	1.11	.743	.463	.016
	Low-achieving	3.67	1.13			
Guided Questions	High-achieving	3.94	1.00	2.00	.054	.105
	Low-achieving	3.22	1.16			

Classroom Activity	School Grouping	*M*	*SD*	*t*	*p*	η^2
Explanations of Data	High-achieving	3.61	1.24	1.38	.175	.053
	Low-achieving	3.06	1.16			
Oral Explanations	High-achieving	2.94	1.21	.256	.799	.002
	Low-achieving	2.83	1.38			
Hypothesis Development	High-achieving	2.33	1.03	.168	.868	001
	Low-achieving	2.28	.958			
Student Observations	High-achieving	4.56	.784	2.67	.012	.173
	Low-achieving	3.56	1.38			
Student-created Questions	High-achieving	2.83	1.15	.269	.789	.002
	Low-achieving	2.72	1.32			
Student-researched Investigations	High-achieving	1.83	.985	<.001	1.00	<.001
	Low-achieving	1.83	.707			
Student-designed Experiments	High-achieving	2.11	1.18	.301	.765	.003
	Low-achieving	2.00	1.02			

In terms of significant effects, teachers in high-achieving schools used open-ended questions more frequently than teachers in low-achieving schools, allowed students to create data tables more frequently, and allowed students to make more observations more frequently than teachers in low-achieving schools. Furthermore, one inquiry-based instructional technique approached significance; teachers in high-achieving schools used guided questions more frequently than those teachers in low-achieving schools. However, a review of the effect size statistics for all of these results shows that the achievement level of a school has fairly little to do with the instructional methods utilized by faculty, as all η^2 values < .20.

In terms of non-significant effects, there was no difference between the two groups of teachers in how frequently they used the following instructional techniques: provide students with appropriate tools to develop their conclusions, engage students in taking data, use cooperative groups in the classroom, have students work in groups, allow students to use data to support explanations, allow students to construct their own personal explanations of the data, allow students to orally defend their explanations, allow students to develop hypothesis, allow students to develop questions based on observations, allow students to plan investigations, and allow students to plan an experiment.

Furthermore, another independent measures t-test was conducted to assess whether teachers in high-achieving schools and low-achieving schools differ in their use of a published science inquiry-based program (where 1 = *yes* and 2 = *no*). The analysis revealed no significant difference between the teachers in the high-achieving schools ($M = 1.61$, $SD = .50$) and the teachers in low-achieving schools ($M = 1.78$, $SD = .43$), $t\ (34) = -1.07$, $p = .291$, $\eta^2 = .03$ (two-tailed).

Discussion

The hypothesis of this study was to see if science teachers in a group of high schools with significant success in the 11th grade PSSA scores more frequently used inquiry-based instruction as compared to science teachers in a group of high schools with significantly lower PSSA scores. This prediction was supported by only three of the 16 inquiry-based instructional techniques surveyed. Students who generally were more successful with PSSA testing had teachers who gave their students frequent opportunities to make observations in their classrooms, allowed their students to create their own methods of data collection more frequently, and more frequently assessed their students using open-ended questions. These other inquiry-based instructional techniques did not have an impact on student achievement in PSSA testing: 1) having adequate tools for students to conduct investigations, 2) having students collect data, 3) using cooperative groups in the classroom, 4) having students do work in groups, 5) having students to think critically about their data, 6) having students use guided questions in developing questions, 7) having students construct personal explanations of their data,8) having students to orally explain their conclusions, 9) having students do research to develop a hypothesis, 10) having students create questions based on their observations,11) having students to plan investigations, 12) having students design experiments, and 13) having teachers use a published inquiry-based program in the classroom. Even though there was significance with the three instructional methods, the analysis showed that other unidentified factors also played a role in distinguishing high- and low-performing schools, as effect size statistics for the significant findings were relatively small.

The results suggest that teachers from both groups were using over 50% of the inquiry-based instructional techniques at least three times a month. These teachers may have known more about inquiry-based instruction through professional development, pressure to succeed in standardized tests, and materials available in textbooks and the Internet (Firestone Monfils and Schorr, 2004; Hammerman, 2005). Teachers who have support from administrators and the right materials could be implementing these instructional techniques on a more frequent basis because they are based on national and state standards (Firestone, Monfils and Schorr, 2004). Teaching experience could also lead to more teachers using these instructional techniques because they feel more confident and are willing to take risks to try these inquiry-based tools (Firestone, Monfils and Schorr ,2004). Teaching experience could also affect how teachers deliver these inquiry-based instructional techniques. Teaching delivery will affect how motivated students will be about science, and therefore being motivated to succeed on the state tests (Longo, 2010, Hammerman, 2005). Other reasons that these results could have occurred could be due to students' ability to problem solve (Abbot, 1999), infer conclusions from data (Enger, 1997), and students' content knowledge on the scientific method (Turner and Rios, 2008).

Second, the results of this study supported the importance of classroom assessments with open-ended questions, because the frequent use of this inquiry-based instructional technique was connected more with higher-performing schools than with lower-performing schools. The frequent use of teacher-developed assessments is linked to success in state tests (Hammerman, 2005). More importantly, formative assessments were a crucial component of student success, because these assessments gave teachers the ability to monitor, diagnose and enhance student learning. Formative assessments will give teachers the ability to correct misconceptions and assist students in correcting them. Formative assessments will also give students more opportunities to ask more questions, to conduct investigations and design projects (Hammerman, 2005). When teachers challenged their students with more open-ended questions, then their students did better in any assessment (Resnick and Resnick, 1992).

Third, the results of this study showed how the frequent use of student-centered curriculum in the classroom, such as students making frequent use of observations and students creating their own data tables, will improve student success in state assessment more than those teachers who do not make use of such curriculum. Longo (2010) stated that teachers who allowed students to change lab procedures and data taking had students who had a better understanding of concepts and also did better on teacher assessments. Chinin (2000) stated that students who make observations and cultivate them into an authentic inquiry task are enabled to reason scientifically and develop the ability to analyze test prompts in standardized tests (Turner and Rios, 2008).

Conclusion

The data in this study suggest that teachers are beginning to accept the challenge to change their curriculum, so their instructional practices match the national and state standards. The state assessments are succeeding to drive local changes in some local curriculum to match the national and state science standards. Schools that scored higher in the standardized testing have teachers and administrators who created and implemented curriculum that matched the national and state science standards, included more student practice in open-ended questions, and gave students more practice in making observations and in creating their own data tables. When schools adapt science curriculum that include these criteria, they will have students who will be proficient in the standardized testing. But more importantly, they will have students who will be curious about science and be proficient in how science can help solve problems.

This research gives teachers one more small piece of evidence that inquiry-based instruction will prepare students to succeed in standardized testing. Since there is a temptation to teach to the test, an inquiry-based curriculum will provide teachers a creative way of letting each student use his/her creativity to put together observations and data. With the data at their fingertips, the teacher can ask open-ended questions so that students construct the science concepts being learned.

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Explicit and Systematic Instruction in a Balanced Literacy Program

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Outstanding educators recognize that teaching is more complex than reiterating the directives from a teacher's manual, known as explicit instruction, or obsessing over the content of a scope and sequence curriculum document, often labeled as systematic instruction. This article espouses the juxtaposition of explicit and systematic instruction with mindful and contextualized practice to enhance the balanced literacy framework and process.

The terms *explicit instruction* and *systematic instruction* permeate the literature on teaching and learning. They are terms that educators hear often, repeat often, and seek to apply in their practice. Unfortunately, little agreement exists regarding the definition and implementation of these descriptors. As with many other educational innovations (whole language, new math, and full inclusion) this lack of common understanding leads to confusion in implementation, often resulting in ineffective practice or abandonment.

Explicit instruction is intentional, obvious, and focused teaching. According to Piper, Marchand-Martella, and Martella (2010) "explicit instruction is defined as clear, accurate, and unambiguous instruction" (p. 10). It is simply the notion that the teacher is clear on the teaching point for the learning episode. Systematic instruction, on the other hand, is a teaching approach where the same set of procedures is used repeatedly and consistently to teach information or a specific strategy. Ritchey (2011, 32) explains, "In general, this means that there is a delineated scope and sequence of instruction and that the process and procedures to be taught are identified, broken into smaller tasks, and taught in a logical manner." In essence, it is a logical, instructional sequence. The teacher has routines for instruction, and learners respond accordingly. When implemented appropriately and in conjunction with the missing pieces of mindful and contextualized, both explicit and systematic instruction can be viewed as best practice. The issue with these terms is the isolated application of such practices in unresponsive (mindless) and unauthentic (decontextualized) contexts.

Some in the educational community espouse the importance of explicit and systematic instruction for both mainstream and special education populations. Despite the realization that learners possess the potential to manipulate and integrate complex content and strategies, they are often subjected to the isolated repetitive and stimulus response behaviors that lack interest, authenticity, and relevance. In scripted versions of systematic and explicit instruction, the teacher clicks, taps, or claps while articulating an isolated vocalization or fact, and the learners repeat the mindless response in a compliant, non-motivated manner. The result is boring, numbing learning that has little connection to authentic understanding and little application to real world skill sets.

Brian Cambourne (1999), an Australian researcher and author, has delineated the missing pieces of the explicit and systematic instruction movement that are neglected. They are the concepts of mindful and contextualized instruction. He explains that mindful learning is a critical element of the teaching process. Cambourne (1999) references Ellen Langer in his explanation of mindful learning. Langer (1989) argues that how individuals "take in" learning ultimately affects

how they apply that understanding in different contexts. As Cambourne (1999) explains, mindful learning can be equated with metacognitive awareness, or the conscious awareness of what is going on in one's own learning process. For the purposes of this exploration, Cambourne's notion of mindful learning is expanded to mindful teaching. In mindful teaching, the content and expectations for learning are directly responsive to the learners' strengths and needs. The teacher is mindful of assessment practices that provide rich, relevant, and meaningful information on the learners' competence with particular content and strategies.

In addition to the concept of mindful teaching, Cambourne (1999) offers the notion of contextualized learning as another missing piece in the explicit and systematic instruction movement. He defines contextualized as learning that makes sense to the learner. Because it makes sense, such learning is not less complicated; it is more likely to result in robust, transferable, useful and mindful learning. To be truly contextualized, learners must be able to connect the learning episode to meaningful and authentic purposes and expectations. According to Brown, Collins, and Duguid (1989), "If teachers only provide narrow learning activities and do not allow for opportunities for students to transfer learning to other domains, this strategy is less useful." It is difficult to connect the content of worksheets and robotic responses to real world learning and authentic behaviors. Contextualized learning is fostered with the use of authentic content, materials, and expectations. It results in more satisfying and engaging learning experiences.

How do educators embrace Cambourne's notions of explicit, systematic, mindful teaching and contextualized learning? I propose the investigation and implementation of the balanced literacy framework to literacy learning. The framework is responsive to each of Camboune's elements of quality instruction. The challenge for teachers is to develop a deep understanding of this framework so that the effective implementation is assured. To foster that understanding, a clear explanation of terms is once again a vital consideration.

For the purposes of this exploration, balanced literacy, as defined by Spiegel (1998), is a decision-making approach through which teachers respond thoughtfully and purposefully to help learners become better readers and writers. A balanced approach "is built on research, views the teacher as an informed decision maker who develops a flexible program, and is constructed around a comprehensive view of literacy" (Spiegel, 1998, p. 117). According to Tompkins (2007), a balanced view of literacy instruction reflects these characteristics:

1. "Literacy is viewed comprehensively, as involving both reading and writing.
2. Literature is at the heart of the program.
3. Skills and strategies are taught both directly and indirectly.
4. Reading instruction involves learning word recognition and identification, vocabulary, and comprehension.
5. Writing instruction involves learning to express meaningful ideas and use conventional spelling, grammar, and punctuation to express those ideas.
6. Students use reading and writing as tools for learning in the content areas.
7. The goal of balanced literacy instruction is to develop lifelong readers and writers" (Tompkins, 2007 p. 15).

In balanced literacy, the teacher adheres to several critical practices that support the learners' reading and writing development as teachers demonstrate, directly instruct, and guide the learning. The amount of support is determined by the instructional purpose and the learners' needs. Scaffolding is addressed through modeled, shared/interactive, guided, and independent work. This instructional sequence is designed in descending support intensity, with the most intense level of support displayed in teacher modeling and the least level of support in independent

work. A more comprehensive explanation of each of these components and their connection to Cambourne's notion of explicit, systematic, mindful, and contextualized is essential for a deep understanding of the balanced literacy alternative to scripted and skill-drilled approaches.

In the modeling component, the teacher engages in read alouds, showing how good readers solve word identification problems and apply comprehension strategies. Often the teacher employs a think aloud experience to demonstrate the word identification or comprehension strategy. In the writing arena, the teacher develops written text in front of the students, while thinking aloud to demonstrate the thought process behind the development of the idea, strategy, or skill in the creation of an extended text. The teacher is intentional in the selection and demonstration of the critical strategy. This method constitutes explicit instruction.

Next, the shared/interactive component releases some of the responsibility to the learners for application of a strategy. Using a text that is accessible to all the learners (big books, charts, electronic displays), the teacher begins by modeling the strategy or problem-solving technique introduced in the read aloud component to extend the learners' experience. After several demonstrations, the teacher challenges the learners to engage in the strategy, "turn and talk" to a partner about their thinking, and then the teacher seeks a response from one or two of the learners. For the writing segment, the teacher offers a common experience and invites the learners to help create a purposeful text for an authentic audience. The teacher serves as the scribe, documenting the learners' ideas on large chart paper. In this process the teacher serves as the facilitator for the composing process. In the earlier grades, this experience is often referred to as "sharing the pen," because the youngsters actually write some of the words. For the upper grades, it is often referred to as collaborative writing, denoting the sense of participation by all the learners. In this experience, all learners have access to the text being created. The strategy or problem-solving technique introduced in the modeling component is continued and reinforced, releasing some of the responsibility to the learners, while providing essential teacher support and facilitation. This method constitutes systematic instruction.

Mindful instruction is addressed in guided learning of balanced literacy. In guided instruction, small groups of homogeneous learners work on materials that are at their instructional level for reading or on writing strategies that are responsive to their writing needs or strengths. It is in this small group setting that instruction is differentiated via the reading materials selected or the writing strategy targeted. The focus of the small group guided instruction is on the application of the strategies or techniques demonstrated in modeled instruction and practiced under teacher supervision in the shared/interactive component. The role of the teacher is to observe, support, and celebrate learner success. This method constitutes mindful instruction.

Contextualized learning is achieved as learners are engaged in the authentic experiences of reading and writing for real world purposes and audiences. With the development of lifelong readers and writers as the ultimate goal of literacy instruction, the independent component is the most critical element for achieving that goal. Research is pervasive on the importance of reading and writing volume in achieving excellence in the literacy processes. Allington (2001, 43) notes, "Kids need to read a lot if they are to become good readers. The evidence on this point is overwhelming. To ensure that all students read a lot, schools need to develop standards for expected volume of reading (and writing)." The more learners read, the better readers and writers they become. The more learners write, the more thoughtful and critical readers and spellers and word wonderers they become. During the workshop time, which is independent reading and writing time, the learners are selecting titles and topics to read and write about. As they engage in practicing the skills, strategies, and techniques modeled in read alouds and modeled writing, and

applied in shared/interactive reading and writing, they are completing the sequence of balanced literacy instruction. This constitutes systematic instruction.

Throughout this gradual release of responsibility in the balanced literacy framework, the teacher is making thoughtful, purposeful, and learner responsive decision regarding what to teach and what materials to use to meet the varied needs of the readers and writers. These critical considerations are responsive to my notion of mindful teaching based on Cambourne's thinking. With no mention of basal programs, scripted programs, or instructional kits, the work of the teacher is indeed thoughtful and reflective. The prescription for instruction is the learners' needs, not the procedures presented in the teacher manuals of commercial programs. Further, the learners' work is contextualized. Authentic, real world and relevant materials serve as the core for instruction. There is no room for worksheets, black line masters, or workbook pages that are decontextualized, mundane and unengaging.

Having identified mindful and contextualized instruction as the missing pieces, teachers now have the completed picture of effective instruction. The balanced approach is explicit in its direct teaching, often through modeling and think alouds, of reading and writing strategies. It becomes systematic once the strategy introduced via modeling, is reinforced through shared/interactive, guided, and independent work. A deliberate strategy connection among all the components of the framework constitutes systematic, explicit, mindful, and contextualized instruction.

Instructional Components	**Balanced Literacy Components**	**Explanation**
Explicit	Read Aloud Modeled Writing	Teacher presents strategy or technique based on standards or curriculum.
Systemic	Shared Reading Shared Writing	Teacher and learner use same strategy or technique demonstrated in explicit instruction of read aloud or modeled writing.
Mindful	Guided Reading Guided Writing	Learners use same strategy or technique. Teacher is mindful of needs in matching learners to text.
Contextualized	Independent Reading Independent Writing	Using self-selected texts and topics, the learners independently apply strategies and techniques presented in modeled, shared, and guided learning.

Our current reality in literacy instruction is that districts, or even states, mandate a "one size fits all" belief, resulting in the procurement of a single commercial program with a "teacher proof" script that negates any consideration of learners' needs or teachers' mindful judgment. To further constrict the professionalism of teachers, the district leaders hold teachers accountable for completing a prescribed number of lessons in a specified time period. To counter this lack of sensitivity to learners' needs and interests and to become responsive to the findings of recent unbiased research on best practices in literacy instruction, the balanced literacy framework is the alternative. It is explicit in strategy instruction; it is systematic in strategy development; it is thoughtful in teacher decision-making; it is contextualized in learner application of strategies in reading and writing. With attention to mindful and contextualized instruction as the missing pieces, explicit instruction and systematic instruction become critical, rather than questionable elements of best practices in literacy instruction and learning.

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The Transition Steering Committee: A Model for Inclusive Transition Program Planning: Lessons Learned

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Introduction

Graduating high school and successfully moving on to postsecondary education and employment can be a challenging, complicated process for all students, but especially so for those with disabilities. Engagement in further education or employment after high school has been historically recognized as a desirable achievement indicator for youth with and without disabilities (Benz, Yovanoff & Doren, 1997; DeStephano & Wagner, 1991). Brown (2000) notes that becoming economically self-sufficient and participating fully in society are inherent components of our nation's equal rights policy. To this day, however, individuals with disabilities struggle to attain the various adult roles their peers take for granted: postsecondary education; employment; living in their own home; becoming involved in recreation, leisure and other activities in the community; and experiencing satisfactory personal and social relationships (Cobb & Alwell, 2009; Newman, Wagner, Cameto, & Knokey, 2009; Test, Mazzotti et al., 2009).

As recent Pennsylvania state mandates set highly specific goals to improve the outcomes for students with disabilities, schools are challenged to deliver instructional programs and services that have the greatest impact not only on academic achievement, but also on postschool success. The purpose of this paper is to share the development of a collaborative leadership team for transition program improvement and the model for planning that ensued.

Transition in IDEA

Since the reauthorization of the Individuals with Disabilities Education Act (IDEA) in 1997, and in response to problems identified by the National Longitudinal Transition Survey (NLTS1), a postschool follow up study of students with disabilities, the outcome of youth with disabilities has become the driving force behind the Individual Education Plan (IEP) at the secondary grade level. The most recent 2004 reauthorization as the Individuals with Disabilities Improvement Act (IDEIA) redefined transition services, expanding the purposes of IDEIA to include preparation for "*further education, employment and independent living. [34 CFR 300.1(a)] [20 U.S.C. 1400(d)(1)(A)]*

> The term "transition services" means a coordinated set of activities for a child with a disability that:
> - Is designed to be within a results-oriented process, that is focused on improving the academic and functional achievement of the child with a disability to facilitate the child's movement from school to post-school activities, including postsecondary education, vocational education, integrated employment (including supported employment); continuing and adult education, adult services, independent living, or community participation;
> - Is based on the individual child's needs, taking into account the child's strengths, preferences, and interests; and

- Includes instruction, related services, community experiences, the development of employment and other post-school adult living objectives, and, if appropriate, acquisition of daily living skills and functional vocational evaluation. [34 CFR 300.43 (a)] [20 U.S.C. 1401(34)]

Under IDEIA, all states are required to develop a 6-year State Performance Plan (SPP) describing how the state will implement the mandates and purposes of the IDEIA, and improve results for students with disabilities. The SPP is built around 20 federally required indicators of compliance and performance. States set measurable and rigorous targets for each year of the SPP, and design improvement activities to reach the targets. States must submit an Annual Performance Report (APR) describing their progress in meeting established targets. Indicators 13 and 14 address secondary transition. Indicator 13 measures the percent of youth aged 14 and above whose IEP includes coordinated measureable annual goals and transition services that will reasonably enable the student to meet his or her postsecondary goals. Indicator 14 measures the percent of youth, no longer in secondary school, who are or have been enrolled in secondary education, competitively employed, or both, within one year of leaving school.

Addressing accountability requirements under IDEIA and SPP, the Pennsylvania Training and Technical Assistance Network (PaTTAN) and Intermediate Unit Transition Consultants trained local education agencies (LEAs) using the Indicator 13 checklist developed by the National Secondary Transition Technical Assistance Center (2007). Trainers also used the Pennsylvania Post School Outcomes Survey (PaPOS), designed to meet the reporting requirements of Indicator 14. With their support, each LEA was to devise a system to train all secondary special education teachers and related staff in the development of transition plans for students turning 14 year of age or older.

The Leadership Team

In order to have the comprehensive input and support needed to evaluate, design and implement improvement programs that would meet IDEIA's rigorous requirements, it was evident that we needed to draw our leadership team from a broad range of disciplines and stakeholders. Our initial Transition Steering Committee (TSC) meeting was broadly representative of stakeholders in the School District, including general and special education professionals, clinical practitioners and building administrators. This representative working group planned to meet three times during the first year of the model plan. In addition to participating in these meetings, TSC members would act as liaisons between the committee and their professional counterparts in each school building. With only three meetings per year, our success depended upon highly organized working meetings and small group work between sessions driven by the action planning that would take place during the meeting.

The TSC projected a three-year pilot plan with outcomes for each year. Planned outcomes for year one were the creation of a district-wide needs assessment, and the articulation and assessment of present transition practices and programs in the general and special education setting. Year two outcomes focused on the creation of an action plan addressing the results of the needs assessment, and the development of protocols to implement the plans. Year three projected the formation of subcommittees to sustain the work of the TSC in the development of ongoing resources, trainings, and community outreach.

At that first meeting, the TSC penned its mission statement: *In collaboration with all stakeholders in the school and community, the Transition Steering Committee's mission is to facilitate the postsecondary education, employment and independent living outcomes of students*

with disabilities by improving the design, coordination and delivery of transition services and activities. Although our initial meetings consisted of only school stakeholders, in order to fully implement our mission, we planned for opportunities for parent and community input as we moved along with our actions plans.

Year One Outcomes

Our priority in the first year was two-fold: In order to bring transition services into alignment across all four secondary schools, we had to first collect and correlate information on transition programs and services presently being delivered in the general and special education setting. Our second priority was to evaluate our transition practices with respect to Indicator 13 requirements and assess the effectiveness of the coordination and delivery of services across the District:

1. *Is there evidence of age-appropriate transition assessment(s)? §300.320(b)(1)*

2. *Is (Are) there a measurable postsecondary goal or goals that covers education or training, employment, and, as needed, independent living? 20 USC 1414 614(d)(1)(A)(i)(VIII)(aa)*

3. *Do the transition services include courses of study that focus on improving the academic and functional achievement of the child to facilitate their movement from school to post-school? §300.320(b)(2)*

4. *Are there transition services in the IEP that focus on improving the academic and functional achievement of the child to facilitate their movement from school to post-school? 20 USC 1401 602(34)(A)*

5. *For transition services that are likely to be provided or paid for by other agencies, is there evidence that representatives of the agency (ies) were invited with parent consent to the IEP meeting? §300.321(b)(3)*

6. *Is (are) there measurable annual IEP goal(s) that will reasonably enable the child to meet the post-school goal(s)?*

(Indicator 13 language, NSTTAC, 2007)

Together with the checklist, several additional tools gleaned from the research were examined for relevance to the District's self-assessment needs and in some cases, were adapted to measure District strengths and needs. One of the tools the steering committee created was an on-line survey adapted from the *Special Education Transition Needs Assessment* developed in March 2005 in collaboration with the Virginia Department of Education and the Shenandoah Valley Regional Program. The results of our survey helped us to address our first priority by providing us with a broad overview of transition programs and services across the district to measure against Indicator 13. Members of the TSC, all secondary special educators, and a sample group of parents of recently graduated youth who had received transition services participated in this pilot survey.

To address our second priority--to assess the effectiveness of the coordination and delivery of transition services across the District--we adapted the Lubbers, Repetto and McGorray (2008) Transition Programs and Services (T-PAS) survey, which was used to identify successful practices and barriers to the effective delivery of services. The T-PAS survey utilized three

questions: (a) What barriers exist that hinder the transition process? (b) What effective practices facilitate the transition process? and (c) What suggestions do you have for improvement of the transition process? We used this method of query as facilitation for program and practice evaluation, again applying the three questions to each requirement of the Indicator 13 checklist: Analysis of information from each of the three questions resulted in identification of strengths and needs for transition programming planning and provided the foundation for improvement and action planning.

Year Two Outcomes

Year two began with the creation of an action plan to implement suggestions for improving and/or adding additional evidence-based transition practices to the District's continuum of services. Test, Mazzotti, et al. (2009) note the challenges educators face in identifying scientifically or evidence-based practices that lead to improved postschool outcomes for students with disabilities. Most recently, in part one of a study funded by the National Secondary Transition Technical Assistance Center (NSTTAC), Test, Fowler, et al. (2009) conducted an exhaustive review of transition literature from 1984-2008 identifying 32 evidence-based practices. While these evidence-based practices are designed to teach students specific transition related skills, the research to date had not yet attempted to scientifically correlate those practices with improved postschool outcomes (p.2). Test, Mazzotti, et al (2009), expanding their research and applying rigorous criteria for quality correlational research, identified 16 evidence based predictors of post school success in one or more of the postschool outcome areas of education, employment, and independent living. These practices were categorized using Kohler's Taxonomy of Transition Planning, a widely accepted framework for planning, implementing, and evaluating comprehensive secondary transition programs (NSTTAC, 2010).

Using evidence-based transition practice research, we addressed Indicator 13 checklist items by articulating a scope and sequence of transition services and activities that would support post school goals in the areas of postsecondary education and training, employment, and independent living. This tool eventually became a Transition Matrix, which we envision serving several purposes: (1) as a way to open communication with students and their families about the importance of early transition planning and encourage students to begin to identify their postschool goals, (2) as a roadmap for teachers to consider when writing IEP plans, and (3) a collection tool to document student progress.

Addressing Indicator 13 checklist items for assessment, we compiled a chart of all age-appropriate transition assessments available throughout the District, the location of the assessment, and professionals who could administer the assessment. The assessments are organized by categories that represent best practices in transition assessment as identified by the National Collaborative on Workforce and Disability/Youth (NCWD) and the National Secondary Transition Technical Assistance Center (NSTTAC).

Year Three Outcomes

Our stated outcome for year three was the formation of subcommittees to sustain the work of the TSC in the development of ongoing resources, trainings, and community outreach. However, in reality, we were still picking up the unfinished strands of years one and two. In addition to Indicator 13 checklist requirements addressed in year two, we addressed the remaining requirements by gathering our work to date in a *Transition Training Manual*, which was distributed to approximately 100 professionals in the District, including teachers, school counselors, social workers, psychologists and administrators. The manual, in binder form, includes the transition language of IDEIA and PA Chapter 14, an annotated IEP, a power point

copy of the transition training that was delivered by the District Transition Coordinator, a reference of suggested transition assessments, an example of language to use when writing postsecondary education, employment and independent living goals, a compilation of agency linkages, and a scope and sequence of transition coursework, services and activities available across the district.

We also tackled the handful of outstanding action planning items and presented our recommendations for practice and protocols. With our major transition resource assembled, recommendations offered, first trainings scheduled, and community outreach underway, we approached the end of our final year feeling as if we had just scratched the surface, and not really ready to hand the Transition Steering Committee over to a handful of subcommittees. We all agreed to meet again in the fall to discuss our own "transition."

Reflection on Lessons Learned

Upon reflection, the most important construct contributing to the on-going realization of our vision is the collaborative leadership provided by the Transition Steering Committee. The importance of this model as it pertains to our vision for improving outcomes for students with disabilities cannot be understated. Although much research is available on the effectiveness of collaborative leadership, we learned some unique lessons from our experience that are worthy of sharing:

1. In addition to special education professionals, look to include diverse stakeholders in your group. Evidence-based predictors of postschool success include areas such as career awareness, community based instruction, work experiences, paid employment, and independent living skills (Test, Mazzotti et al, 2009). The delivery of such transition services in a school district and community requires the coordination of wide-ranging resources and supports that are above and beyond what is typically available to the special education teacher. When creating your team, consider input from school counselors and regular education academic teachers, including those that teach consumer science, vocational and elective courses. Look for input from the community in such areas as adult education, business, community services, and of course parents. And don't forget administrative services in your district, such as Health Services, Transportation, Technology, and Operations. Members representing these areas can provide expertise as your committee addresses the design and delivery of transition services and activities. With that in mind, during the reconstruction of two new high schools, we were able to collaborate with our Operations department on the development and design of model apartments in each high school. Students with disabilities now use those apartments as labs to learn and practice the independent living skills they will need to fully participate as adults in the community.

2. When forming your collaborative leadership group, look to include members who may also be involved with other committees in the District looking to improve student outcomes. By including these members, both groups benefit from the shared expertise and commitment to student success. In addition, this collaboration will allow your vision to "take seed" in other initiatives, promoting its generalization, growth, and acceptance into the culture of the district. An example of this is the crossover of TSC's mission and the School Counselors' initiative to implement a continuum of career planning assessments and activities for students from middle through high school using a software program that allows students and families to explore, research, track and plan postschool goals.

3. Start with inclusive transition planning, and then move on to specialization. Inclusion in general education was the most common predictor category among the studies reviewed (Test, Mazzotti et al, 2009). In our model, we identified "inclusive transition planning" as one that accesses supports, services and activities in the least restrictive general education setting as a natural step in a student's transition, supported and supplemented by specially designed services targeted for the student's specific needs. Consider programs already being delivered in the general education setting as a foundation for your transition programming. Your transition steering committee can address the effective coordination of accommodations and modifications that can be made to existing programs so that identified students can benefit from receiving them in the inclusionary environment. Examples of this include the Career Planning program delivered by School Counselors to all students. Another example of this is the collaboration forged between existing community based career programs in the general education curriculum and special education transition programming. As a result, we have enhanced the continuum of work experience opportunities to offer identified youth, spanning the range from independent career explorations with modifications and accommodations to more highly specialized coursework and job coach supported curriculum.

4. Provide structure to your meetings. In our model, we adapted the three questions of the T-PAS survey to structure our discussions. Participants formed groups by profession: teachers brainstorming with teachers, psychologists with psychologists, administrators with administrators, and so on. This allowed each group to dig deeply into the questions with the support of peers sharing similar roles and responsibilities when identifying what worked and didn't work in their present practices. The groups were then reorganized by groups of professionals from each secondary school building. This second grouping gave each member the opportunity to work with a different set of professionals to understand viewpoints and collaboratively create suggestions for improvement in their schools. This process of identifying strengths and barriers to best practice with diverse stakeholders, and then making suggestions for improvement, drove the three-year plan. Meetings opened and closed with an action plan review, with small groups reporting on their progress, so that implementing our suggestions, not just brainstorming, became the focus and our measure of success.

5. Finally provide linkages to parents and adult service providers. Although correlational research has yet to identify interagency collaboration and parent participation with improved postschool outcomes, both categories are ones that have been part of the large body of research that focuses on collaborative practices in transition (Test, Mazzotti et al., 2009) To that end, we enhanced training and outreach to the community with the Transition eBoard, an online resource maintained by the Transition Coordinator for staff, students and parents with educational articles and linkages for community disability supports, postsecondary education, vocational training, employment, legal rights and services, work incentives and benefits coordination, waivers, healthcare, financial aid, assistive technology, voting, transportation, parent support groups, and a calendar of upcoming transition events.

Conclusion

As we embraced the broader notion of inclusion as it related to transition planning for our youth with special needs, it became clear that our model's success in improving students' post school outcomes was dependent upon its seamless infusion into the culture of the district. We believe our vision has the best chance of affording systems change because of the inclusive collaboration of the Transition Steering Committee and their recommendations for a consistent model of transition service delivery supported by professionals in both the general and special education setting. When fully implemented, we trust that our most lasting success in

implementing this model will be the assurance that all youth with disabilities, supported by the finest minds and resources of our school and community, will have the best possible chance to participate in all that adult life has to offer.

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Linking To Learn: Preservice Teachers in a Learning Community

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Recent trends in educational reform emphasize a more integrated curriculum for undergraduate college students (Galles & Olson, 2008; Miller & McCartan, 1990). This paper presents a project undertaken by two education faculty members in an attempt to enhance the preparation of pre-service elementary teachers. After noticing that a number of pre-service teachers were not transferring knowledge between courses, these two professors made changes to two existing courses with the goals of building a learning community to facilitate the integration of the course concepts and to provide opportunities to teach interdisciplinary lessons.

This paper will discuss the outcomes of the linked courses and how students perceived the experiences. How the students continued to use what they learned in the courses in their current and later field placements as well as its effect on their sense of self-efficacy will also be discussed.

Review of the Literature

When examining the underpinnings of this study, three main concepts are relevant: the importance of a learning community, the integration of content areas (referred to here as linking), and the sense of teacher efficacy. Each of these three concepts will be discussed in its relationship to the linked courses and this study.

Learning Community

One way in which colleges can promote integrated thinking is by creating learning communities. A learning community is an arrangement of existing course organization and materials so that students are given more opportunities to engage with the material in meaningful ways to enhance understanding and maximize student learning (Galbenick, MacGregor, Matthews & Smith, 1990; Lenning & Ebbers, 1999). Students who participate in learning communities can benefit by higher academic achievement, better retention rates and satisfaction with college life, as well as an improved quality of thinking and communicating (Lenning and Ebbers, 1999, Tinto & Love, 1995). Although learning communities can be developed into various forms, all share characteristic such as smaller student/faculty groups, encouraging integration of curricula and developing support networks between students and between students and faculty. One of the most common types of learning community is the linked-course concept.

Linking

Linked courses are ones in which a cohort of students co-register for two courses that are related by content or skills development. The linked courses are often scheduled back-to-back in order to facilitate collaborative work (Malnarich, 2005). Linked courses can be either across disciplines or interdisciplinary. The goal of the linked courses is to promote curricular coherence

by faculty, who teach independently or together, by coordinating their syllabi or creating a shared assignment (Galles & Olson, 2008). Because linking is a form of learning community, students often benefit by earning a higher course grade, participating in collaborative projects, and engaging in more active learning in classes that focus on higher-level thinking skills (Zhao & Ku, 2004). When linking was first conceived, it was most often used by faculty to coordinate a content-based course and a skill course (e.g. a writing course and history course) so that students could use the skills to convey the content (Kellogg, 1999). In recent years it has extended to courses linked by content or theme. By linking courses, the faculty members create a structure that enables students to make connections between content areas (Galles & Olson, 2008).

Sense of Teacher Efficacy

Teacher efficacy can be defined as a concept that describes the extent to which a teacher is certain about his ability to influence student motivation and learning and to make judgments regarding his abilities to design instruction that is effective (Onafowora, 2005; Tschannen-Moran, Woolfolk-Hoy, & Hoy, 1998). The importance of teacher efficacy has been studied and documented in a variety of settings (Gibson & Dembo, 1984; Poulou, 2007; Tschannen-Moran, Woolfolk-Hoy, & Hoy, 1998). Multiple benefits have been associated with a high sense of teacher efficacy, including the ability to better manage a classroom in order to devote the majority of class time on academics rather than on discipline, the ability to assist struggling learners, the ability to successfully motivate students, and the ability to seek out new teaching methods and utilize a variety of teaching materials (Allinder, 1995; Gibson & Dembo, 1984; Midgley, Feldlaufer, & Eccles, 1989; Soodak & Podell, 1993). More recently, researchers (Swackhamer, Koellner, Basile, & Kimbrough, 2009) examined how content courses that also included aspects of pedagogy were related to the self-reported levels of teacher efficacy by in-service teachers. Their work suggested that general teaching efficacy increased after increasing content knowledge and becoming engaged in associated teaching methods.

Others have also examined the concept of teacher efficacy as it pertains to student teachers. It has been suggested that it is important to study the levels of efficacy beliefs in student teachers since these beliefs are often resistant to change once they have been established (Erdem & Demirel, 2007).

Procedure

Description of Courses

This study took place at a small liberal arts school in the mid-Atlantic region of the United States. The college serves approximately 1,500 undergraduate students with 1 out of 4 students seeking teacher certification. The two linked course were requirements in the elementary education coursework. Two faculty members in the education department linked the courses *Reading and Writing for Early and Special Learners* and *Numerical and Manipulative Mathematics for Early and Special Learners*. The two method classes were offered in both fall and spring semesters during the academic year, with fall being the only time the courses were linked. The enrollment of the fall sections of the courses were limited to the same twenty students and ran consecutively two days per week for 1 hour and 15 minutes each session. Students in the linked classes had separate class requirements with the exception of an integrated field experience activity.

*Reading and Writing for Early and Special Learner*s addressed the development of emergent literacy skills in young and special needs children, ranging from infancy through third

grade. The course focused on how to teach the young child to read. Emphasis was placed on the five essential skills (phonemic awareness, phonics, fluency comprehension and vocabulary) of reading.

Numerical and Manipulative Mathematics for Early and Special Learners provided pre-service teachers current trends, techniques, technologies, and research about mathematical teaching in the special, early elementary and inclusive settings. Classroom strategies, hands-on techniques, the importance of communication, and the use of manipulative tools were discussed and presented.

Among the fall course requirements was a required integrated math and literacy field experience. The instructors for the two courses selected children's books that contained a math component (such as *Math Curse, Alexander Who Use to be Rich Last Sunday,* and *How Many Seeds in a Pumpkin,*) and also selected the pre-service teachers to work in pairs for the project. The pre-service teachers were required to create a lesson that integrated literacy and mathematical concepts. The pre-service teachers first presented the lesson in the methods classes where professors and students gave feedback on strengths and areas of improvement of the lesson. Students were given time to refine or correct the lesson. Near the end of the semester, pre-service teachers had the opportunity to implement their lesson with fourth-grade elementary students at a local public elementary school under the supervision of the two instructors and the classroom teacher. The pre-service teachers were required to reflect on their lesson in a written paper.
Participants

Twenty students in the fall of 2009 were enrolled in the linked courses. Thirteen of the 20 students were invited to take part in the study because they were entering student teaching. Six of those students accepted to take part in the study. All six were white, female, and seeking elementary teaching certification. One student was a post-baccalaureate student seeking teaching certification; the other five were traditional undergraduate students seeking a Bachelor of Science degree in elementary education. The mean age was 24.2. All participants had taken the introductory education courses, which included Educational Psychology, Foundations of Education, and Strategies and Techniques of Instruction. Participants met with an interviewer in groups of three.

Data Collection

The instructors of the courses developed a series of questions to allow participants to share their thoughts regarding the linked courses and outcomes. A student researcher interviewed the participants during November of the student teaching year. All interviews were audio-recorded and transcribed. The interview sessions took approximately one hour per group. The interviewer asked the following questions:

1. Prior to taking the linked courses, did you feel more confident in your ability to teach reading or math content?
2. How did this change by the end of the courses?
3. What aspects/format of the course did you like? Was the co-teaching method used by the professors beneficial? Explain.
4. Do you feel that you benefitted through the field experiences in this course? In what way? Can you describe your particular field experience?
5. During your pre-student teaching, have you witnessed the idea of integrating reading and math used in the classroom? In what ways?
6. Have you found yourself more inclined to teach math or reading using an integrated approach after taking the linked courses?

7. Do you feel you can apply concepts learned and used in the linked courses with other methods courses or curriculum in the classroom? If so, in what way?

Data Analysis

Recorded interviews were transcribed into Microsoft Word. Cross-causal comparative analysis of the interview data was conducted to reveal themes. After review of the interview data, the research team determined two themes regarding self-efficacy: field experiences and use of prior knowledge. We coded these documents and compared them to initial coding by a different coder; the first set of information served as the standard. The target reliability percentage is usually a minimum of 90% agreement between coders (Miles & Huberman, 1994). Intercoder reliability was calculated using the following formula: [Number of Agreements/(Total Number Agreements + Disagreements) x 100] and was found to be 93%.

In order to explore the qualitative data, we needed to be flexible and thorough with our management techniques. Our data achieved Tesch's standard (1990), which recognized that worthy qualitative data systems do not over analyze with a large amount of detail.

Results

The purpose of this study was to better understand if the students' sense of self-efficacy improved after taking the linked method courses and if they were able to identify opportunities to integrate content areas in later field experiences. Based on the results, the linked courses did have a positive effect on their beliefs of efficacy and the students did continue to see connections in the field. Bandura (1997) described perceived self-efficacy as being concerned "not with what one has but with belief in what one can do with whatever resources one can muster" (p. 6). In this study, the students reported that they felt better prepared to teach students and they felt more confident in their knowledge of the content matter. They also liked the ability to practice within their field experiences. This supports the belief that real world opportunities need to be provided for pre-service teachers and efficacy beliefs are related to field experiences (Enochs, Scharmann, & Scharmann, 1995; Fives, Hamman, & Olivarez 2007; Knoblauch & Hoy, 2008). The students reported that they valued the integrated field experiences, which could be considered mastery experiences, in these classes and that they believed that they had a higher sense of self-efficacy.

The following are two representative statements shared by the pre-service teachers.

- "I liked that they gave us the math problem that we were going to be asking the student to do…then, we were better able to direct the students. I thought that was a very nice link of reading and math."
- "I thought they [field experiences] were different than any other courses. Through field experiences, I never got to sit down and teach a math lesson. I observed math lessons, but I never got to sit down with a few students and teach a math. I liked that I was able to do that."

The biggest reported increase in self-efficacy was their confidence in teaching math alongside reading. Four of the six participants felt more confident in teaching reading prior to the course. After the linked courses and the field experience, they still felt confident that they would be successful at teaching reading. They all felt more confident to teach math. This supports Parameswaran's (1998) claim that real world experiences lead to a higher sense of self-efficacy in pre-service teachers. This is demonstrated through some of the sample comments below.

- "I feel more confident teaching math now because I wasn't comfortable getting my point across before."

- "I feel more confident in math…what helped the most was using manipulatives and learning how to implement those to help me get my point across to students."
- "I feel much more confident in teaching math after the class. I was able to get a bird's eye view. I feel like I have so many different strategies that I can pull out. It's very concrete."

The two participants that felt more confident in math at the beginning of the course reported they would be stronger reading teachers at the end of the course. "Math has always been a stronger subject for me and I never liked reading, but after the course, I learned more in reading that I could apply in the future."

Lastly, the students shared examples of how their experiences in the classroom related to what they learned about integrating content.

- "As I observe my teacher, I think of ways to integrate reading with math."
- "In fourth grade, they went into more of preparing for [state standardized exam] especially because they have to support their response with words. So there's a lot of that going on in fourth grade. They are given problems as an anticipatory set to a lesson and they have to write in their think pads how they solved their problems, what confused them about their problems, and really reflect on the problem itself."
- "The second grade teacher did do this one lesson where they were called break-aparts: They'll say on this part of your board draw a piece of lettuce, this is the lettuce part of your garden. On this part of your board draw a carrot. Then they had little discs that were supposed to be rabbits and they break ten of them –five in the lettuce and five in the carrot. Then what we ended up doing was reading Peter Rabbit, because that way it made it so much more believable—it really wasn't believable before. So at least in their imaginations they could think, Ok this is a garden, and they could use that strategy when they had to generate word problems—three rabbits went to Mr. McGregor's garden and three stayed home—it was nice to add more context to that lesson and make it a little more believable."

Discussion

This study examined pre-service teachers' reports of efficacy beliefs and their perceptions of integrated content in the subsequent field experiences. The students' answers aligned with the research that the more experiences the students have in the field, the higher their sense of self-efficacy (Bandura, 1997; Enochs, Scharmann, & Riggs, 1995). Rice (2003) found that "field experiences tend to be disconnected from the other components of teacher education programs, leaving teachers poorly equipped to apply their knowledge from classroom coursework to teaching in the field" (p. 38). Through the interviews, the students explained that they began to reflect about ways literacy and math were connected throughout the day and think about how they would integrate the two while they taught. Students also reported that they began to reflect more on the experience because the classes were linked, expectations were explicit, and the experience was structured and supervised. Maloch (2003) and his colleagues stated that carefully supervised experiences were more important in improving efficacy than the number of hours.

The present study's findings must be considered cautiously due to its small sample size and the lack of accountability for variables that may have influenced the results beyond participation in the linked courses. Although the grade distribution for the courses did not differ significantly when comparing the linked semesters with the semesters the courses were not linked, student comments on course evaluations tended to be more focused on the usefulness of the field experience and the sense of community created during the linked semesters.

Past research suggests that the higher the level of beliefs of efficacy the better (Allinder 1995; Gibson and Dembo 1984; Guskey 1988). However, is a pre-service teacher's high sense of efficacy good when he does not have much experience motivating children, teaching children, or applying strategies in the classroom? The instructors of these courses sought to better understand the development of efficacy beliefs of pre-service teachers when they were in a situation requiring them to make connections between content areas. Through this small-scale investigation, the instructors hope to further the discussion and discovery of the potential benefits of examining how teacher educators organize courses with related field experiences and to continue the discussion of better understanding of the development of efficacy beliefs of pre-service teachers.

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An Invitation to Write for Pennsylvania Educational Leadership

Denise G. Meister and Judith L. Zaenglein - Co-Editors
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See the next page of this issue of *Pennsylvania Educational Leadership* for details regarding submission of manuscripts.

Manuscript Submission Guidelines

Content

Pennsylvania Educational Leadership provides for the sharing of formal and informal research related to the improvement of curriculum and supervision. Some issues may be thematic as determined by the editors in response to topics of timely interest. Submitted manuscripts should be responsive to this purpose and reflect research or analyses that inform practices in these areas.

Format

All submissions must be prepared using word processing software and saved in *Microsoft Word* (DOC) or rich text format (RTF). Manuscripts must comply with the guidelines in the *Publication Manual* of the American Psychological Association, sixth edition, 2009. Double-space all text, including quotations and references, use 1-inch margins for top and bottom, and use 1.25-inch right and left margins. All text should be Times New Roman 11-point font. Complete references should be placed at the end of the manuscript, using the "hanging indent" function. Additional article publication formatting details are listed on the *PEL* web site (http://citl.hbg.psu.edu/pel).

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Submissions should be sent via e-mail to pascdpel@psu.edu. Submissions must include three separate files saved in *Microsoft Word* (DOC) or rich text format (RTF) as follows:

1. Cover Page – Include the information listed below in a separate file
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2. Abstract – In a separate file describe the major elements of the manuscript in 100-150 words. Do not include your name or any other identifying information in the abstract.

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Manuscripts are peer reviewed as they are received. Manuscripts must be received by the second Friday in September for consideration for the fall issue and by the first Friday in February for the spring issue. It is the policy of *PEL* not to return manuscripts. Authors will be notified of the receipt of the manuscript. After an initial review by the editors, those manuscripts that meet the specifications will be sent to peer reviewers. Authors will be notified if the manuscript is judged to be not appropriate for review. Following peer review and editor review, the author(s) will be notified as to the status of the manuscript. The journal editors reserve the right to make editorial changes in the manuscript.