

National Impact: Creating Teacher Leaders Through the Use of Problem-Based Learning

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ABSTRACT

This article deals with the use of Problem-Based Learning. The emphasis on high stakes testing, classroom size, diversity, school violence, and much more impact public education and professional preparation programs relative to teacher education. Issues are presented dealing with Accrediting Commissions and Professional Organizations, and the use of strategies for implementing Problem-Based Learning (PBL). Two models are presented describing a system of Traditional Methods of Delivery and the recommended Method of Delivery Using Problem-Based Learning. Professors who employ quality Problem-Based Learning cases in their classrooms provide teacher candidates the opportunity to experience the process of solving real world problems as opposed to reading and memorizing lists of standards, teaching strategies, and qualities of effective teachers. Learning in context makes the information real and relevant. Teacher candidates immersed in educational research and knowledgeable about national, professional, and content standards are best equipped to become highly qualified in their fields. As a result they may be prepared to become teacher leaders.

Problem-Based Learning and Reading Case Studies

The overall purpose of professional education programs is to prepare teacher candidates to enter the classroom prepared to provide an education to PK-12 students. Students enter colleges of education with varying experiences, knowledge of the field of education and general understanding of the content they will be responsible for teaching. At a minimum, future teachers must develop a full knowledge of their content, learn to read and interpret content and professional standards, keep abreast of current research in education, and learn how to adapt their teaching to the "best practices" of their academic fields. Ultimately, teacher candidates need the skills necessary for successful long term employment. In education, a further goal is to create teacher leaders and teacher researchers who will contribute positively to the field of education and profoundly impact student learning.

Teacher Education Programs

The education profession is under constant scrutiny. Recent criticisms stem from issues concerning high stakes testing, classroom size debates, challenges of multicultural classrooms, and classroom violence, to name but a few. National commissions continue to focus attention on public education and the preparation of teachers for America's classrooms through discussions about reform efforts and research on learning theory (e.g. National Research Council, Annenberg Institute for School Reform, Conference Board for the Mathematical Sciences). With all of this public scrutiny, educators of future teachers have a complicated task, and often a task understood by few outside the profession. Teacher educators are responsible for insuring teacher candidates are competent in their content fields or are "highly qualified", know, understand, and can apply the standards of their content area curriculum councils, and meet professional teaching standards. In addition, teacher education programs are charged with teaching diversity, differentiated instruction, equity, professionalism, and other issues related to public service.

Accrediting Commissions and Professional Organizations

Colleges and schools of education across the nation look to the recommendations of accrediting commissions and professional organizations to guide the design of their programs. Many states require or strongly recommend teacher education programs be accredited by the National Council for the Accreditation of Teacher Education (NCATE). NCATE sets national standards for teacher education programs that provide initial and advanced licensure to teacher candidates. NCATE works cooperatively with other

national councils on education such as the Council of Chief State School Officers or the National Board for Professional Teaching Standards and curriculum councils such as The National Council of Teachers of Mathematics (NCTM), The National Council of Teachers of English, or the International Reading Association (IRA) to devise content and program standards.

Teacher education programs in 34 states adhere to the Interstate New Teacher Assessment and Support Consortium (INTASC) standards developed by the Council of Chief State School Officers (CCSSO, 2007). The purpose of the INTASC standards is to guide teacher education programs in developing future teachers who possess the knowledge and skills to be highly qualified teachers. Specifically, INTASC uses the following statement as its guiding principle, "An effective teacher must be able to integrate content knowledge with the specific strengths and needs of students to assure that all students learn and perform at high levels" (CCSSO, 2007). Further, the focus on curriculum standards of professional organizations, embedded within the INTASC standards, mandates teacher candidates develop an understanding of the core content and pedagogical knowledge of their academic fields. Programs that align themselves with NCATE and INTASC standards are better equipped to produce teachers who are highly qualified.

There is constant debate on what constitutes a quality teacher. The No Child Left Behind Act (NCLB) provides an operational definition of a quality teacher: "The law requires that all teachers of core academic subjects in the classroom be highly qualified. This is determined by three essential criteria: (1) attaining a bachelor's degree or better in the subject taught; (2) obtaining full state teacher certification; and (3) demonstrating knowledge in the subjects taught" (Ed.gov, 2006). The current re-enactment of the Elementary and Secondary Education Act (ESEA) originally written into law in 1965 has focused on the accountability of public education (PL 89-10, 20 U.S.C. § 6301 et seq.). One component of "No Child Left Behind" is the requirement that only "highly qualified" educators populate PK-12 classrooms. While each state defines what "highly qualified" means, teacher educators must insure future teachers meet the "highly qualified" definitions of each state and meet the rigorous goals of national curriculum councils and teacher education standards.

In addition to meeting the goals of INTASC, teacher preparation programs want to produce teachers that will continue to engage in professional development. First year teachers should be motivated to continue to engage in quality professional development that helps them to continue to develop as teacher leaders. The final goal is that new teachers will develop communities of colleagues who keep abreast of developments in national curriculum councils and encourage positive changes in response to these developments in their own communities.

All of these goals can be achieved most effectively through a program that does more than provide a basic education for future teachers. The program needs to create leaders in the field of education. This is accomplished through quality learning communities, holding students to rigorous standards, and equipping them with necessary resources to continue their own professional growth. The demands of this kind of program cannot be adequately accomplished through traditional lecture, readings, and class assignments. Nor can the program of study be a collection of classes students progress through on their way to graduation and teaching licensure.

With this as a primary goal, faculty strive to find the best teaching strategies to have students comprehend and apply the national standards and inculcate in teacher candidates a commitment to be the best teacher possible. However, there is no way teacher candidates can understand all ramifications of the standards or the best teaching strategies or the latest research at this early stage of their careers. Instead, beginning teachers need to know where to find the strategies, how to read the research, and how to apply best practices (Cochran-Smith, 2001). To this end, faculty are committed to teaching students how to analyze a problem, find solutions to the problem, and then correctly apply the current best practice so that later as practicing teachers, they will have a model to follow. Once again, problem-based learning can provide the methodologies to meet these goals.

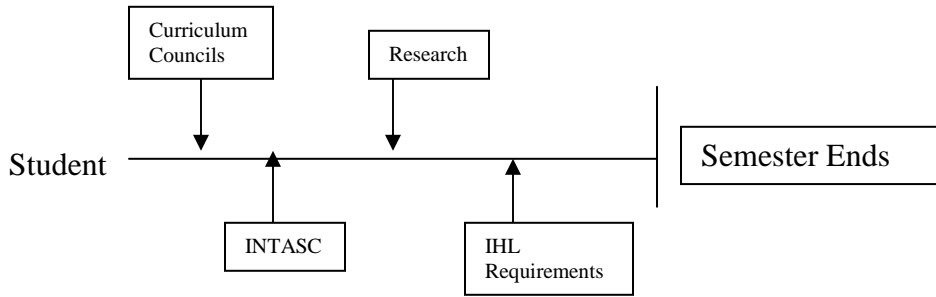
Use of Problem-Based Learning to Foster Teacher Leaders

Problem-based learning (PBL) is an emerging methodology for creating teacher leaders. One strategy for using problem-based learning is to use cases throughout teacher preparation programs. Writing PBL cases and facilitating the research process is different from a traditional classroom. Preservice teachers' abilities to research and apply their knowledge as a result of being taught through problem-based learning is generally believed to be worth the effort required to change teaching styles (Watson & Groh, 2001). Educational research has continuously shown that learning in isolation does not translate to best practice. In an effort to produce highly qualified teachers, teacher preparation programs search for ideal methods for preparing teacher candidates.

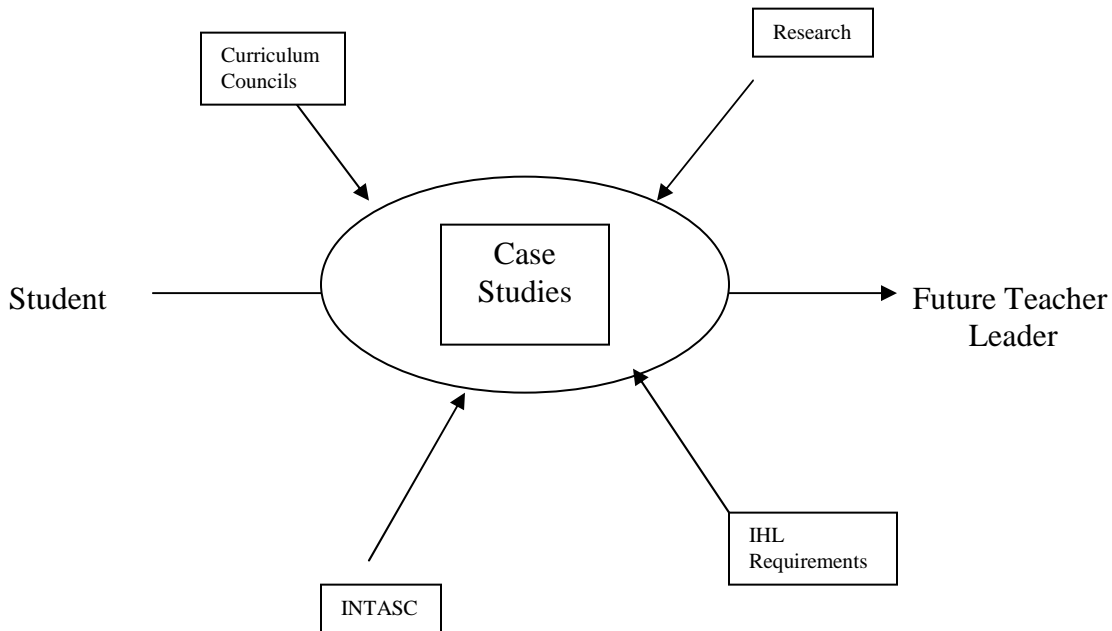
Cases, written specifically for use in problem-based learning, are problems based on real world issues that force students to problem solve, research, and produce authentic solutions (Brocato & Franz, 2003). Accordingly, components of a quality case include a complex problem that engages students. Problems are at least initially open-ended to connect previous learned knowledge with content area goals. PBL cases are more effective when integrated throughout professional education courses. Faculty members using PBL must continue to research and expand PBL cases to meet the individual needs of their courses and keep the case relevant and timely.

The following graphic represents the informational delivery system in a traditional classroom versus the delivery system in a classroom using problem-based learning:

Traditional Methods of Delivery



Methods of Delivery Using Problem-Based Learning



The scenarios that follow are examples of PBL cases used in two professional education courses. For each scenario, there is a discussion of the problem identified by faculty member, a description of the learning goals of the cases, and the national or state standards that are addressed within the context of the problem.

Problem-Based Learning and Math Methods

Math content courses, math methods courses, and general education courses are all designed to provide preservice math teachers with the knowledge and understanding

to be successful classroom teacher. By design, these courses should complement each other leading to the ultimate goal of producing quality math teachers. Given the continued attention focused the preparation of math teachers some may argue these courses are still not meeting the stated goal of preparing highly qualified math teachers (Ball, 2000; CBMS, 2001).

Authors of the NCTM principles and standards define overarching teaching themes, called the teaching principles, in the *Principles and Standards for School Mathematics* (PSSM) (NCTM, 2000, p. 11). One of these themes is teachers must know and have a deep understanding of the math they teach in order to develop similarly deep and thorough understanding of mathematical concepts in their students. Specifically, the NCTM teaching principle states, "Effective mathematics teaching requires understanding what students know and need to learn and then challenging and supporting them to learn it well" (pg 11, NCTM, 2000). Equally important is the equity principle which states, "Excellence in mathematics education requires equity—high expectations and strong support for all students" (NCTM, 2000, p. 11).

Students enter math methods courses with naive mindsets that what they need to know is the exact "how to" for anything and everything they could possibly be responsible for teaching. Students want a "how to" guide, which is actually in direct contrast to the recommendations of the math education community. However, preservice teachers really need to understand the NCTM and state teaching standards, know how to use these and other resources to develop meaningful math classes and problem solve learning issues in the classroom. According to Cochran-Smith (2001), teachers need to assess what students know and what students do not know and be able to adjust instruction accordingly, while they correctly assess misconceptions student may hold (Polya, 1981; Karp, 2004). Engaging in problem solving methodologies that extend beyond "traditional problem solving" involves teacher candidates in recognition of what constitutes a deep understanding of mathematical concepts and what may be misconceptions. This need for deep understanding of math pedagogies coupled with classroom time structure issues make a problem-based learning environment ideal for math methods courses (Lappan & Rivette, 2004).

To meet the needs of the students and learning goals, an in-depth PBL case has been developed to use in the math methods course. The PBL case is designed to expand teacher candidates' understandings of the math that will be taught, students' mathematical thinking and potential methods to clarify students' thinking using mathematical pedagogy based on the NCTM standards. The specific learning goals for teacher candidates include the following; a) to understand students learn and understand in a wide spectrum of ways, b) be confident that their own understanding of math to analyze and understand a student's thoughts, c) to recognize good thinking versus faulty thinking and understand what makes the difference, and d) to make instructional decisions based on the recommendation based on NCTM. Teacher candidates are expected to use NCTM standards, state curriculum standards and professional math journals to find potential solutions to the problems.

Several versions of the PBL case are used. In general, the case involves a group of secondary students struggling on a specific learning issue (low test scores on high stakes testing, lack of ability to move from concrete to abstract in state required courses, lack of appropriate technology use, etc.). Teacher candidates prepare a solution and presentation

that is given to “members of a community school board”, “the superintendent”, “local math leaders”, and “parents”. Embedded in the expectations are clear descriptions of the standards and recommendation based on sound research. This project is broad in definition and scope, while meeting the specific learning goals of the program.

It is important to have teacher candidates assess the critical issues in real-world problems and present solutions that are research based in the mathematical community. Taking this ability into the secondary classroom provides a knowledge background that ultimately makes a teacher leader. While all educators should be aware of the issues and ideas, it is the teachers who know and apply this knowledge that become leaders in their schools. Further, teachers that adhere to the rigorous high-quality instruction have classrooms that promote deep understanding of the academic content. As more and more teachers come to the classroom with clear understanding and deep working knowledge of their academic curriculum councils, PK-12 students will receive instruction from highly qualified teachers.

Problem-Based Learning and Reading Case Studies

As part of many teacher education programs, teacher candidates are required to take a one semester content area reading course (Stewart, 1990). Students in this course focus on content area and grade level specific research on reading, strategies for teaching reading, and methods to remediate struggling readers. Faculty who teach this course often note that students do not have time during one semester to assimilate all of their instruction on reading or feel competent to initiate instruction in their own classrooms. Students perform well on individual assignments but are often unable to apply reading strategies or knowledge of reading research to assignments meant for application. Faculty conclude that students rarely demonstrate a competent working knowledge of reading instruction during classroom practice as an outcome of one semester of reading instruction (Hall, 2005).

It is critical for teachers to know how to analyze students' reading skills and provide instruction designed to increase their students' reading abilities. This requires that teachers have a thorough knowledge of reading pedagogy and be able to identify gaps in their own knowledge about reading, study current research, and apply the appropriate principles to their reading instruction. These skills come from practice. University classrooms that utilize PBL in content area reading courses provide the format for learning these skills. Providing students with PBL cases that require them to "dig" into the reading research beyond the lecture notes and class assigned readings helps them become competent reading instructors. Students who become thoroughly familiar with knowledge of reading pedagogy and availability of reading resources can integrate appropriate components of this knowledge into their own teaching repertoires.

The types of cases that directly lend themselves to accomplish this goal in content area reading courses are case studies of fictitious students. Teacher candidates are presented with the scope of a particular fictitious students' strengths and weaknesses in regard to reading abilities. Candidates are then required to put this students' situation in

the context of a particular grade level and content area, and by devising pertinent background information. After that is accomplished, candidates are expected to demonstrate proficiency in designing an authentically based intervention plan for remediating the fictitious students' reading abilities, or lack of them. Often cases offer fictitious students with built in learning problems which require candidates to do research as they would be required to do if a real student in their classroom exhibited the same type of problems with regard to reading. Types of problems embedded in reading case studies include language differences, learning disabilities that directly affect reading, and behavioral issues.

Although the traditional type of reading case study more frequently includes reading difficulties, the opposite of the continuum is for candidates to demonstrate an understanding of instructional strategies for students who are proficient readers and actually love to read. It is unfortunate that teachers are so frequently engaged in working through problem situations that they may miss the opportunity to extend instruction to upper level readers in their classes. This type of case study challenges teacher candidates to think through this situation before they encounter it in a classroom.

Both types of case studies, fictitious problematic readers and proficient readers, require teacher candidates to problem solve, apply reading research within their content areas, and develop basic repertoires of reading strategies to address specific reading issues. The written assignment that follows must be a thorough unit plan complete with assignments, supplemental readings, proposed assessments, and follow up reading overviews that demonstrate a full program for the fictitious student. This documentation requires teacher candidates to make decisions about their own philosophies of reading instruction and how they will address any national or state standards related to reading instruction in their content fields. Whether to pursue whole language instructional methods or self selected reading materials as part of their case study intervention plans are examples of these decisions.

The hope is that teacher candidates will be able to become more confident in their abilities to teach reading as a result of case study "rehearsals." Through the use of case studies and PBL methodologies, teacher candidates may develop a broader understanding of their roles in the classroom regarding direct reading instruction. As a result, these future teachers may be leaders in their school systems regarding reading initiatives in the content areas.

Concluding Remarks

In conclusion, professional education programs striving to create teacher leaders adopt methodologies and instructional strategies that promote problem solving and critical thinking based on real world problem situations. One of these methods is problem-based learning. Professors who employ quality PBL cases in their classrooms provide teacher candidates the opportunity to experience the process of solving real world problems as opposed to reading and memorizing lists of standards, teaching strategies, and qualities of effective teachers. Learning in context makes the information real and

relevant. Teacher candidates immersed in educational research and knowledgeable about national, professional, and content standards are best equipped to become highly qualified in their fields. As a result they may be prepared to become teacher leaders.

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