

# Collaboration is the Key to Successful Teacher Preparation

Lola LeCounte  
Claudette Burge

*Two Bowie State University (BSU) departments collaborated to strengthen teacher candidate preparation to meet the growing challenges of classroom instruction, especially in mathematics.*

The teaching and mathematics departments organized an instructional team of university faculty and developed a plan for improving the Praxis scores and mathematical skills of the undergraduate and graduate teacher candidates. The instructional team, led by the project director, met for an orientation/planning session at which time the problems facing BSU teacher candidates were discussed. During the previous academic year (2003-2004), approximately 78% of the undergraduate teacher candidates struggled to pass their basic mathematics courses and 25% of the juniors had not passed Praxis I in mathematics. As of October, 2003, eight of the thirty undergraduate seniors had not passed the Praxis I examinations and seven of the eighteen graduate Master of Arts in Teaching (MAT) Students had not passed the Praxis I examinations in areas of reading, writing and mathematics.

The charge that the instructional team was given was to devise a plan which would include instructional strategies, techniques, and classroom/laboratory activities that would result in strengthened mathematical skills for graduate and undergraduate candidates. It was also necessary to provide greater support for mathematics majors; thus, improving candidates' performance on Praxis I and II mathematics examination. The team realized that there was a need to strengthen the instructional delivery in both mathematics content and pedagogy.

There were planned workshops for instructors and teacher candidates. Teacher candidates could choose to make daily visits to the BSU Praxis Laboratory and Mathematics Laboratory. A graduate student, whose main responsibility was to assist candidates in the Praxis Laboratory, was asked to join the instructional team.

## **NEEDS ASSESSMENT**

A needs assessment was conducted and the team determined that several mathematics courses needed revision and new courses needed to be developed. Educational Testing Services (ETS) Praxis materials were needed: Study Guides and Praxis Tests and other resource materials needed to be ordered. A resource room was instituted for conducting workshops and for tutoring teacher candidates. It was necessary to develop ActionPlan/Timelines to cover the extent of the project, which included formative and summative evaluation.

## Action PLAN / Timeline – PMET Project

Target Dates	Activity
September 8 and 15, 2004	Planning Session
September 29, 2004	Identify undergraduate and graduate students for tutoring and Praxis preparation.
October 6, 2004	Begin weekly schedule of sessions in the Praxis Lab.
October 7, 2004	Conduct orientation workshop for BSU faculty and graduate assistant.
October 13, 2004	Begin math tutoring for undergraduate and graduate teacher candidates.
October 13, 2004	Begin tutoring in areas of reading and writing.
November 30, 2004	Revise syllabi for Spring 2005, MATH 115 MATH 210 ELED 314
February 4 – May 13, 2005	Implement revised syllabi. Resume tutoring and Praxis preparation
Feb 4, 2005	<b>Workshop I:</b> Praxis Information Pre-test with Plato
February 11, 2005	<b>Workshop II:</b> Decimals, Fractions, Percent
Feb 25, 2005	<b>Workshop III:</b> Factoring
March 18, 2005	<b>Workshop IV:</b> Post-Test with Study Guides
	<i><b>Both utilization of the Praxis lab and tutoring in math, reading and writing are ongoing.</b></i>
April 26, 2005	Visit by PMET Monitor
October 3, 2005	<b>Workshop I</b> Administer pre-test to both graduate and undergraduate students using Plato.
October 4, 2005	Review revised syllabi for MATH 115 and 210. Set up resource center to be used for tutoring and workshops.
October 10, 2005	Begin weekly schedules of sessions in the Praxis Lab. Monday 5 – 7 pm.
October 12, 2005	Begin tutoring in mathematics every Tuesday from 5 – 7 pm. Tutor in writing and reading every Tuesday from 5 – 7 pm. During tutoring, Praxis Study Guides and subject area mathematics materials will be utilized.
	<i><b>Lab activities and tutoring will be ongoing in preparation for Praxis I and II.</b></i>
October 19, 2005 and October 26, 2005	Classroom observation MATH 115 MATH 210 ELED 314
	<b>Workshop II</b> Decimals, fractions, percent

Target Dates	Activity
	<b>Workshop III</b> Fractions
December 20, 2005 – January 31, 2006	<b>Workshop IV</b> Follow up assistance and support using diagnostic feedback for teacher candidates who must re-test.
	Formative evaluation is ongoing.
December, 2005	Summative Evaluation

## IMPLEMENTATION

### A. Course Revisions

#### 1. **MATH 115 (Math For Elementary School Teachers)**

This is a course in elementary mathematics with strong emphasis on problem-solving, which is designed for the prospective elementary school teacher. More focus was placed on the following: problem-solving strategies, mathematical reasoning, elementary set theory, structures and concepts of arithmetic, integers, rational numbers, the real number system, statistics and probability. The Praxis Series Study Guide was added as one of the required texts.

#### 2. **MATH 116 (Introduction to Math Ideas)**

This course was redesigned to introduce the non-science major to some facets of mathematical thinking, problem solving and to prepare the education student for Praxis I. Topics include set notation, set operations, logic, introduction to probability and statistics, and a survey of basic ideas from Euclidean geometry.

#### 3. **MATH 210 (Elementary Geometry)**

This course covers material which includes graphing, solving and determining linear equations and graphing inequalities in preparation for finding solutions to linear programming models, the fundamentals of set theory, counting techniques, probability and applications of Markov Chains. Also, the Praxis Series Study Guide is a part of the required course materials.

### B. New Courses

#### 1. **MATH 350 (Praxis II Mathematics)**

The purpose of this course is to prepare students for the Praxis II mathematics content examination. The material covered in this course ranges from topics in basic arithmetic, elementary algebra, geometry and trigonometry to topics in calculus, linear algebra, discrete mathematics, computer algorithms and the principles of mathematical modeling.

#### 2. **MATH 450/505 (Overview of College Mathematics)**

This course consists of a sequence of distinct modules, each devoted to the treatment of a specific fundamental result, principle, or theme in college level mathematics; providing a grand synthesis of the entire undergraduate mathematics curriculum.

**C. Praxis Pre-testing (Using Plato Simulated Test Systems)**

The graduate assistant administered the diagnostic test in all areas of Praxis I. Candidates' correct and incorrect responses were determined followed by conferencing with BSU instructors to provide feedback and the development of individual plans of support.

Candidates were scheduled into the Praxis Lab to perform practice exercises using Plato software. Candidates also had access to the Plato software for use on their home computers making it possible for them to have unlimited availability. Furthermore, candidates had the advantage of the Praxis Series Practice Tests for the Pre-Professional (PPST). These are official authentic full-length practice tests with instructions, answer sheets, answer keys and score conversions.

**D. Workshops**

A series of workshops for teacher candidates included:

1. Praxis information
2. Explanation of test series
3. Pretest with Plato
4. Use of Praxis Lab
5. The structure of the test
6. Using decimals, fractions and percentages
7. Test-taking skills

**E. Tutoring**

Tutoring was provided in an effort to strengthen candidates in mathematics and reading. Candidates met weekly in the Resource Center and received help in areas previously identified as target areas.

1. In **reading**, concentration was on the three levels of comprehension: literal, interpretive, and critical with the greatest concentration on the interpretive level. Practice tests were also utilized during tutoring along with a variety of other reading resources.
2. In **mathematics**, the discussion of math anxiety was used as a means to remove the feeling "I can't do math." Several math myths were discussed and the importance of time and effort that one must use to master the material presented to him. Much of the concentration during mathematics tutoring centered around algebra and geometry.

**F. Teacher Preparation Using Technology and The Mathematics Lab**

The use of technology is not always easy for some. It is a natural that one will always use the things that he/she is familiar with. To be familiar with the latest technology one must read (or investigate), learn (or be demonstrated to), actually practice (using his imagination) on how it can be used in a teaching setting. Many times this takes more than one wants to put into the learning or the use of any form of new technology. It is just like the typewriter verses the computer, the wood stove verses the gas or electric stove or US mail verses email.

The following steps are used in the preparation of a student to teach math.

**1. Have technology workshops**

To explore what is on the market, a variety of vendors are invited into the classroom to share their latest technology. If technology is purchased, on-going learning workshops are provided on how to use this technology.

**2. Integrate technology in teaching**

The professor shows the future educator how he can maximize his teaching by demonstrating the technology available in teaching. The following technology is used:

- a. The software that accompanies the adopted text
- b. The computer
- c. Power point
- d. Elmo (Version of the overhead)
- e. Smart Board Technology (technology with built in math graphics)

**3. Involve students in the use of technology in the class**

- a. Put the students to work and let them experience the use of the different media.
- b. Teach them to use the best of both worlds, with and without the technology.
- c. Have the students use technology in doing their homework, reports and presentations.
- d. Help them to use technology creatively. Remember they are only going to use what is comfortable to them when they start teaching.

## **ASSESSMENT AND EVALUATION**

Ongoing assessment required checking for candidates' understanding as they completed assigned tasks, responded to questions asked during tutoring and workshop activities and performed successfully on written tests. Formative evaluation was conducted based on each candidate's progress shown during the administration of practice tests. This was in relationship to their individualized plan for support.

Summative evaluation for the project was based on candidates' grade improvement in mathematics courses and the percentage of candidates, undergraduate and graduate, passing Praxis I and Praxis II in reading and mathematics during academic years 2004 and 2005.

According to the 2004-2005 ETS Summary, BSU undergraduate and graduate teacher candidates performed at an 89% pass rate. During the 2005 – 2006 academic year, 75% of the undergraduate students received a grade of C or better in the basic math courses (MATH 115, MATH 116 and MATH 210).

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