



# **The Checklist of Guiding Principles for In-service Teachers**

Developed by the

**Angelo State University MELL Initiative Team**

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## **Introduction**

The Checklist of Guiding Principles for In-service teachers was adapted from the Preservice Practices Framework for Math Education's Checklist of Guiding Principles. The Checklist of Guiding Principles for In-service teachers was developed to enable in-service teachers to assess their strengths, their weaknesses, and their needs for further professional development in the teaching of mathematics to the English Language Learner (ELL) and other special needs populations.

Items from this Checklist of Guiding Principles are based on the suggestions from research. The Written Review of Research and Annotated Bibliography of Scholarly Literature Pertaining to Teacher Preparation and Mathematics Instruction for English Language Learners can be found at the end of the original Preservice Practices Framework document.



## Suggestions from Research

A wide variety of teacher preparation pathways exist in the attempt to provide high quality mathematics instruction for a highly diverse student population. Although the paths vary, research suggests specific preparation experiences related to teaching and learning mathematics which all paths should include.

Review of research suggests the following are the best methods for reaching ELL students:

- Raise awareness of language used in the classroom.
- Encourage empathy for learning language.
- Use synonyms and avoid homonyms.
- Employ consistent math vocabulary.
- Avoid more than three phrases for basic operations.
- Speak slowly, enunciate clearly, and repeat often.
- Use short sentences.
- Employ active voice and present tense.
- Require journaling.
- Encourage student-to-student interaction.
- Provide explicit guidance in grammar and pronunciation.
- Use clear, legible handwriting.

Review of research suggests the following strategies:

- Emphasize problem solving in authentic contexts.
- Encourage development of critical thinking skills.
- Teach the language of mathematics (vocabulary and syntax).
- Create language supportive classrooms (i.e. journaling).
- Teach reading skills specifically for mathematics content.
- Connect mathematics to students' background and experiences.
- Vary instructional methods.
- Utilize an authentic and meaningful assessment plan.

Review of research suggests helping teachers of ELL students to:

- Develop cultural understanding.
- Develop a repertoire of methods and skills for adapting instruction to the needs of ELL students.
- Distinguish between language difficulties and learning problems.
- Utilize cooperative learning strategies to encourage interaction between ELL students and native English-speaking students.



## Mathematics Content

Circle the number that best describes your familiarity with the content from these courses.

note: Course titles and topics vary at different institutions (see pp. 6-7)

Check the  box of the content areas in which you feel you need more training in to help you teach ELL students.

| Content: Mathematics Courses                          |                      |               |                             |                             |
|---|----------------------|---------------|-----------------------------|-----------------------------|
| Need more training<br>↓<br>↓<br>↓                     | Proficient<br>(good) | (comfortable) | Familiar<br>(uncomfortable) | No Experience<br>(clueless) |
| <b>Algebra</b>  |                      |               |                             |                             |
| <input type="checkbox"/> Abstract Algebra             | 4                    | 3             | 2                           | 1                           |
| <input type="checkbox"/> College Algebra              | 4                    | 3             | 2                           | 1                           |
| <input type="checkbox"/> Linear Algebra               | 4                    | 3             | 2                           | 1                           |
| <b>Pre-Calculus</b>                                   |                      |               |                             |                             |
| <input type="checkbox"/> Trigonometry                 | 4                    | 3             | 2                           | 1                           |
| <input type="checkbox"/> Analytic Geometry            | 4                    | 3             | 2                           | 1                           |
| <b>Calculus</b>                                       |                      |               |                             |                             |
| <input type="checkbox"/> Calculus I                   | 4                    | 3             | 2                           | 1                           |
| <input type="checkbox"/> Calculus II                  | 4                    | 3             | 2                           | 1                           |
| <input type="checkbox"/> Calculus III                 | 4                    | 3             | 2                           | 1                           |
| <input type="checkbox"/> Advanced Calculus (Analysis) | 4                    | 3             | 2                           | 1                           |
| <b>Foundations of Mathematics</b>                     |                      |               |                             |                             |
| <input type="checkbox"/> Elementary Math I            | 4                    | 3             | 2                           | 1                           |
| <input type="checkbox"/> Elementary Math II           | 4                    | 3             | 2                           | 1                           |
| <input type="checkbox"/> Elementary Math III          | 4                    | 3             | 2                           | 1                           |
| <b>Geometry</b>                                       |                      |               |                             |                             |
| <input type="checkbox"/> Euclidean                    | 4                    | 3             | 2                           | 1                           |
| <input type="checkbox"/> Informal                     | 4                    | 3             | 2                           | 1                           |
| <b>Other</b>  |                      |               |                             |                             |
| <input type="checkbox"/> Probability - Statistics     | 4                    | 3             | 2                           | 1                           |
| <input type="checkbox"/> Problem Solving              | 4                    | 3             | 2                           | 1                           |
| <input type="checkbox"/> Number Theory                | 4                    | 3             | 2                           | 1                           |
| <input type="checkbox"/> Math Modeling                | 4                    | 3             | 2                           | 1                           |
| <input type="checkbox"/> History of Mathematics       | 4                    | 3             | 2                           | 1                           |



## Instructional Methods

Check the  box for each instructional method you use in your classroom.  
 Check the  box for each instructional method you feel you need more training in.

| Use                      | More<br>Training         |   |
|--------------------------|--------------------------|---|
|                          |                          | <b>Modeling</b>   |
| <input type="checkbox"/> | <input type="checkbox"/> | hands-on manipulatives  |
| <input type="checkbox"/> | <input type="checkbox"/> | technology  |
| <input type="checkbox"/> | <input type="checkbox"/> | visual demonstrations   |
| <input type="checkbox"/> | <input type="checkbox"/> | kinesthetic activities  |
| <input type="checkbox"/> | <input type="checkbox"/> | real-life (authentic) problems -- connect content to students<br>background and experiences |
| <input type="checkbox"/> | <input type="checkbox"/> | discovery learning  |
| <input type="checkbox"/> | <input type="checkbox"/> | observation   |
|                          |                          | <b>Communicating</b>  |
| <input type="checkbox"/> | <input type="checkbox"/> | lecturing   |
| <input type="checkbox"/> | <input type="checkbox"/> | writing   |
| <input type="checkbox"/> | <input type="checkbox"/> | developing reading skills specifically for content  |
| <input type="checkbox"/> | <input type="checkbox"/> | building appropriate vocabulary   |
| <input type="checkbox"/> | <input type="checkbox"/> | translating vocabulary into conversational language   |
|                          |                          | <b>Teaching/Learning Techniques</b>   |
| <input type="checkbox"/> | <input type="checkbox"/> | individual learning   |
| <input type="checkbox"/> | <input type="checkbox"/> | peer-to-peer  |
| <input type="checkbox"/> | <input type="checkbox"/> | small groups  |
| <input type="checkbox"/> | <input type="checkbox"/> | whole class   |
|                          |                          | <b>Assessment Techniques</b>  |
| <input type="checkbox"/> | <input type="checkbox"/> | written   |
| <input type="checkbox"/> | <input type="checkbox"/> | portfolios  |
| <input type="checkbox"/> | <input type="checkbox"/> | oral  |
| <input type="checkbox"/> | <input type="checkbox"/> | rubrics   |
| <input type="checkbox"/> | <input type="checkbox"/> | alternative assessments   |



## Professional Development

Check the  box for each area you feel you need more training in.

### Classroom Teaching/Preparation

- lesson planning
- working with students
- teaching lessons
- TEKS rewriting
- adjusting lessons for diverse populations
- grading procedures
- available resources – such as Texas Mathematics Diagnostics System (TMDS)

### Support Systems in Relation to ELL Students

- classroom management
- discipline management
- involvement and communication with parents
- involvement and communication with administrators

### Special Populations Modifications

- diagnostics -- distinguishing language difficulties from learning problems
- assessment -- adapting assessments to eliminate language barriers
- lesson plan adaptations -- designing lessons to meet special needs and talents
- cultural understanding -- tackling cultural differences in the classroom
- student interactions -- facilitating interactions between ELL students and native English-speaking students

Check the  box for each of the types of professional development that you would like to have available to meet your needs.

- grade level oriented workshops
- innovative ideas for subject areas
- visiting other schools
- observing other teachers
- establishing a teacher mentoring program
- attending subject area conferences
- vertical alignment work sessions
- other \_\_\_\_\_



## Mathematics Courses Topics

**Abstract Algebra** -- Elementary number theory including integer congruences and modular arithmetic, equivalence relations, basic topics in ring and group theory including the fundamental homomorphism theorems, structure and basic properties of fields.

**College Algebra** -- Exponents and radicals, logarithms, factoring, algebraic quotients, systems of equations, inequalities, absolute value, complex numbers, quadratic equations, binomial theorem, progressions, theory of equations, and determinants.

**Linear Algebra** -- The algebra and geometry of finite dimensional vector spaces; determinants; linear transformations and matrices; characteristic values and vectors of linear transformations.

**Plane Trigonometry** -- Trigonometric functions, radian measure, logarithms, solutions of triangles, functions of composite angles, identities, trigonometric equations, and complex numbers.

**Analytic Geometry** -- Coordinate systems, translations, rotations, lines, circles, conics, parametric equations, and elementary three-dimensional geometry.

**Precalculus** -- algebraic expressions, equations and inequalities, complex numbers, polynomials, rational functions, exponential and logarithmic functions, inverse functions, systems of equations and inequalities, matrices, sequences and series, binomial theorem, trigonometric functions, graphs, identities, and equations; trigonometric form of complex numbers; powers and roots of complex numbers; parabolas, ellipses, hyperbolas; parametric equations; polar coordinates.

**Calculus I** -- limits of a function, continuity; derivatives.

**Calculus II** -- (Riemann) integral, relationship between the derivative and integrals; evaluating integrals

**Calculus III** -- Multivariate calculus and applications; indeterminate forms, multiple integrals, infinite series, and approximation techniques.

**Analysis** -- The real and complex number systems, Euclidean spaces, countable and uncountable sets, metric spaces, compactness, convergent sequences, Cauchy sequences, limits and continuity, uniform continuity, the derivative, the Riemann-Stieltjes integral, sequences and series of functions, uniform convergence.

**Mathematics for Elementary/Middle School Teachers I** -- Sets and relations, the system of whole numbers, numeration systems, the system of integers, elementary number theory, fractions and rational numbers, decimals and real numbers.



## Mathematics Courses Topics

**Mathematics for Elementary/Middle School Teachers II** -- Decimals and real numbers, nonmetric geometry, metric geometry, measurement, graphs, probability and statistics.

**Middle School Mathematics** -- Mathematical reasoning and problem solving; numerical systems, structures, operations, and algorithms; patterns, relations and functions, algebraic concepts and applications; geometry, measurement, and spatial reasoning; probability and statistics. Graphing calculators and other supporting technologies.

**College Geometry** -- A study of Euclidean, non-Euclidean, and transformational geometry.

**Probability and Statistics** -- Mathematical models of random events; probability spaces; random variables; dependence and independence; mean values and moments of random variables; distribution functions, and characteristic functions.

**Problem Solving** -- Designed to help the student develop analytical skills through exposure to a variety of problem solving techniques utilizing algebra, geometry, trigonometry, and other areas of precalculus mathematics. Includes graphing calculator and instructional software applications.

**Elementary Number Theory** -- Tests for divisibility, unique factorization, integer representations, greatest common divisors, least common multiples, congruences, and the distribution of primes.

**The Evolution of Mathematics** -- Historical development of selected mathematical concepts, terminology and algorithms; impact of mathematics on the development of our culture.

**Abstract Mathematics** -- Logic, set operations, equivalence relations, properties of the real number system, cardinality of sets, and related topics, with an emphasis throughout on developing the necessary skills to read and construct formal mathematical arguments.