



**MELL**

Mathematics for English Language Learners

# Contemporary Practices in Math Preservice Education

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# Math Education Programs

- Elementary, middle school, and secondary certification
- Texas State University System institutions
  - Angelo State University
  - Lamar University
  - Sam Houston State University
  - Sul Ross State University
  - Texas State University at San Marcus

# Certifications Examined

- 8-12 Math
- 4-8
  - 4-8 Math
  - 4-8 Math/Reading
  - 4-8 Math/Science
  - 4-8 Generalist
  - 4-8 Bilingual Specialist
  - 4-8 Generalist/Special Education
- EC-4
  - EC-4 Generalist
  - EC-4 Generalist/Special Education
  - EC-4 English as a Second Language
  - EC-4 Bilingual Generalist
- EC-8
  - EC-4 Generalist and/or 4-8 Math
- EC-12
  - EC-12 Special Education

# [ Data Collected ]

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- Interviews
- Mathematics course requirements
- Teacher education experiences
  - professional knowledge courses
  - early field experiences
  - student teaching

# Interviews

1. What math and/or education courses do you teach?
2. Which of these courses are required for:
  - a. Secondary Teacher Cert with math
  - b. Middle School (grades 4-8) Teacher Cert with math
  - c. Elementary (K-4) Teacher Cert with a math specialty
  - d. Elementary (K-4) Teacher Cert without math
  - e. Alternative Certification -- if available

# [ Interviews ]

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3. Which of these courses address ELL, LEP or Bilingual in some form or another?
  - a. Time spent in each course
  - b. Special activities in these courses
  - c. Special assessment techniques in these courses
  - d. Chapters in books
  - e. Can we get copies?

# [ Interviews ]

4. What field experiences do you require for your pre-service teachers?
  - a. Field experiences addressing ELL, LEP, or Bilingual?
  
5. Are you aware of any field experiences, not required that are available for your pre-service teachers?
  - a. Field experiences addressing ELL, LEP, or Bilingual?

# [ Interviews ]

6. Are there any ELL or LEP or Bilingual practices currently in use at your university?
7. Are there any ELL, LEP, or Bilingual practices in the planning stage for the near future at your university?
8. Are there any ELL or LEP or Bilingual practices currently in use or in the planning stage in the area or at the local schools?



# [ Interviews ]

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9. Do you know of any local schools' concerns and/or needs for ELL, LEP, and Bilingual students?
10. What language(s) in the local schools fall into the ELL / LEP category?
11. Are there any courses available that can be taken as electives which address ELL, LEP, or Bilingual in some form or another?

# University Course Requirements

Type of Certification	Mathematics Course Requirements	Teacher Education Course Requirements
8-12 Math	A Survey of Mathematics with Applications Abstract Algebra Analytic Geometry Calculus I Calculus II. Calculus III College Algebra Introduction to Problem Solving Linear Algebra Plane Trigonometry Probability and Statistics I ----- Analysis Or Topology	<b>Curriculum &amp; Instruction (Pedagogy)</b> Secondary School Organization and Curriculum Teaching Techniques in the Secondary School Teaching Techniques in the Secondary School*(same name but different course) <b>Early Childhood</b> <b>Educational Psychology</b> Adolescent Development <b>Language &amp; Literacy</b> <b>Reading</b> Reading in the Secondary School Content Areas <b>Special Education</b> <b>Student Teaching</b> Supervised Teaching in the High School

# University Course Requirements

Certification	Math Courses	Teacher Ed Courses
8-12 Math	10-12 Courses	<p><b>C &amp; I (Pedagogy)</b> 2-4 Courses</p> <p><b>Early Childhood</b> 0 Courses</p> <p><b>Ed Psychology</b> 1 Course</p> <p><b>Language &amp; Literacy</b> 0 Courses</p> <p><b>Reading</b> 1 Course</p> <p><b>Special Education</b> 0 Courses</p> <p><b>Student Teaching</b> 1-2 Courses</p>

# University Course Requirements

Certification	Math Courses	Teacher Ed Courses
4-8	3-14 Courses	<p><b>C &amp; I (Pedagogy)</b> 4-7 Courses</p> <p><b>Early Childhood</b> 0-1 Courses</p> <p><b>Ed Psychology</b> 1-2 Courses</p> <p><b>Language &amp; Literacy</b> 0-4 Courses</p> <p><b>Reading</b> 2-7 Courses</p> <p><b>Special Education</b> 0-1 Courses</p> <p><b>Student Teaching</b> 1 Course</p>

# University Course Requirements

Certification	Math Courses	Teacher Ed Courses
EC-4	3-4 Courses	<p><b>C &amp; I (Pedagogy)</b> 4-8 Courses</p> <p><b>Early Childhood</b> 0-6 Courses</p> <p><b>Ed Psychology</b> 1-2 Courses</p> <p><b>Language &amp; Literacy</b> 0-6 Courses</p> <p><b>Reading</b> 3-6 Courses</p> <p><b>Special Education</b> 0-6 Courses</p> <p><b>Student Teaching</b> 1-2 Courses</p>

# University Course Requirements

Certification	Math Courses	Teacher Ed Courses
EC-8	8 Courses	<p><b>C &amp; I (Pedagogy)</b> 6 Courses</p> <p><b>Early Childhood</b> 3 Courses</p> <p><b>Ed Psychology</b> 1 Course</p> <p><b>Language &amp; Literacy</b> 0 Courses</p> <p><b>Reading</b> 4 Courses</p> <p><b>Special Education</b> 1 Course</p> <p><b>Student Teaching</b> 2 Courses</p>

# University Course Requirements

Certification	Math Courses	Teacher Ed Courses
EC-12	3-6 Courses	<p><b>C &amp; I (Pedagogy)</b> 4-6 Courses</p> <p><b>Early Childhood</b> 1-2 Courses</p> <p><b>Ed Psychology</b> 1 Course</p> <p><b>Language &amp; Literacy</b> 0-1 Courses</p> <p><b>Reading</b> 1-5 Courses</p> <p><b>Special Education</b> 6-8 Courses</p> <p><b>Student Teaching</b> 1-2 Courses</p>

# Field Experiences

Type of Certification	Mathematics Courses	Teacher Education Courses
8-12 Math		<b>Curriculum &amp; Instruction (Pedagogy)</b> Secondary School Organization and Curriculum (10 hrs) Teaching Techniques in the Secondary School (10 hrs) <b>Early Childhood</b> <b>Educational Psychology</b> Adolescent Development (10 hrs) <b>Language &amp; Literacy</b> <b>Reading</b> Reading in the Secondary School Content Areas (10 hrs) <b>Special Education</b> <b>Student Teaching</b> Supervised Teaching in the High School



# Field Experience Requirements

Certification	Math Courses	Teacher Ed Courses
8-12 Math	0 Courses	<p><b>C &amp; I (Pedagogy)</b> 2-3 Courses</p> <p><b>Early Childhood</b> 0 Courses</p> <p><b>Ed Psychology</b> 0-1 Courses</p> <p><b>Language &amp; Literacy</b> 0 Courses</p> <p><b>Reading</b> 0-1 Courses</p> <p><b>Special Education</b> 0 Courses</p> <p><b>Student Teaching</b> 1-2 Courses</p>

# Field Experience Requirements

Certification	Math Courses	Teacher Ed Courses
4-8	0-3 Courses	<p><b>C &amp; I (Pedagogy)</b> 1-4 Courses</p> <p><b>Early Childhood</b> 0-1 Courses</p> <p><b>Ed Psychology</b> 0-1 Courses</p> <p><b>Language &amp; Literacy</b> 0-2 Courses</p> <p><b>Reading</b> 0-3 Courses</p> <p><b>Special Education</b> 0-1 Courses</p> <p><b>Student Teaching</b> 1-2 Courses</p>

# Field Experience Requirements

Certification	Math Courses	Teacher Ed Courses
EC-4	0-2 Courses	<p><b>C &amp; I (Pedagogy)</b> 1-4 Courses</p> <p><b>Early Childhood</b> 0-4 Courses</p> <p><b>Ed Psychology</b> 0-1 Courses</p> <p><b>Language &amp; Literacy</b> 0-5 Courses</p> <p><b>Reading</b> 0-3 Courses</p> <p><b>Special Education</b> 0-5 Courses</p> <p><b>Student Teaching</b> 1-2 Courses</p>

# Field Experience Requirements

Certification	Math Courses	Teacher Ed Courses
EC-8	0 Courses	<p><b>C &amp; I (Pedagogy)</b> 4 Courses</p> <p><b>Early Childhood</b> 2 Courses</p> <p><b>Ed Psychology</b> 1 Course</p> <p><b>Language &amp; Literacy</b> 0 Courses</p> <p><b>Reading</b> 3 Courses</p> <p><b>Special Education</b> 1 Courses</p> <p><b>Student Teaching</b> 2 Courses</p>

# Field Experience Requirements

Certification	Math Courses	Teacher Ed Courses
EC-12	0-2 Courses	<p><b>C &amp; I (Pedagogy)</b> 2-4 Courses</p> <p><b>Early Childhood</b> 0-1 Courses</p> <p><b>Ed Psychology</b> 0-1 Courses</p> <p><b>Language &amp; Literacy</b> 0 Courses</p> <p><b>Reading</b> 0-3 Courses</p> <p><b>Special Education</b> 0-5 Courses</p> <p><b>Student Teaching</b> 1-2 Courses</p>

# Preliminary Observations

## 8-12 Math

- 8-12 mathematics teachers are being trained like professional mathematicians.
- There are no field-experience requirements in the mathematics courses.
- Although all programs require content area reading and a methods course, none are specifically targeting reading for mathematics.
- No special education courses are required.
- From the course descriptions, there is no specified ELL training in any 8-12 program.

# [ Preliminary Observations ]

## 4-8

- 4-8 programs are new and under revision with little consistency in the math curriculum.
- 4-8 Generalist & Bilingual Specialist require 3-6 math courses. Teachers may not have sufficient preparation to teach math in middle school.
- Some programs require content area reading. None are specifically targeting reading for math.
- From the course descriptions, there is no specified ELL training in most 4-8 programs.
- Mathematics courses for 4-8 certification do not have field experience requirements.

# Preliminary Observations

## EC-4

- Elementary trained teachers take the mathematics core requirement of College Algebra and only two foundations of mathematics courses. There are no field-experience requirements in the mathematics courses.
- Although all programs require reading courses, none are specifically targeting reading for mathematics.
- Mathematics courses for elementary certification do not have field experience requirements.



# Preliminary Conclusions

**Certification programs may be improved by including:**

- Expanded training in planning and adapting lessons to directly address the needs of diverse learners, particularly ELL students (TExES PPR for all certifications, Domain I, Competency 2)
- A special education course to diagnose and address special populations including ELL students
- Additional mathematics courses for elementary certification

# [ Preliminary Conclusions ]

**Certification programs may be improved by including:**

- Required field experiences in mathematics courses
- Modeling with technology, manipulatives, graphics, visual demonstrations, kinesthetic activities, writing, and verbal descriptions for secondary mathematics courses and College Algebra
- Activities designed to rewrite each Mathematics TEKS objective into several key statements that can be easily understood by ELL students

# Groundwork for Best Practices Framework

**Review of research suggests the following:**

- 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.

# Groundwork for Best Practices Framework

Review of research suggests using the following:

- Short sentences
- Active voice
- Present tense
- Journaling
- Student to student interaction