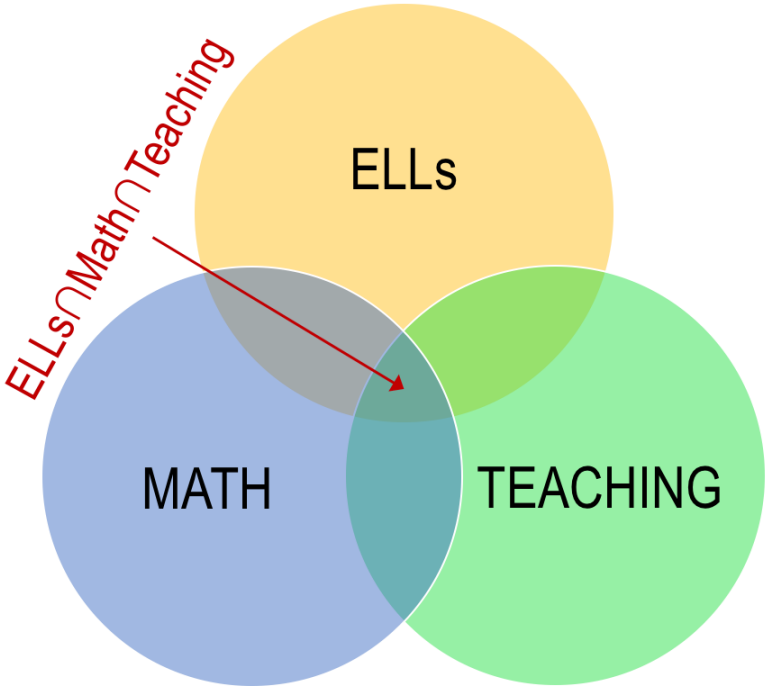
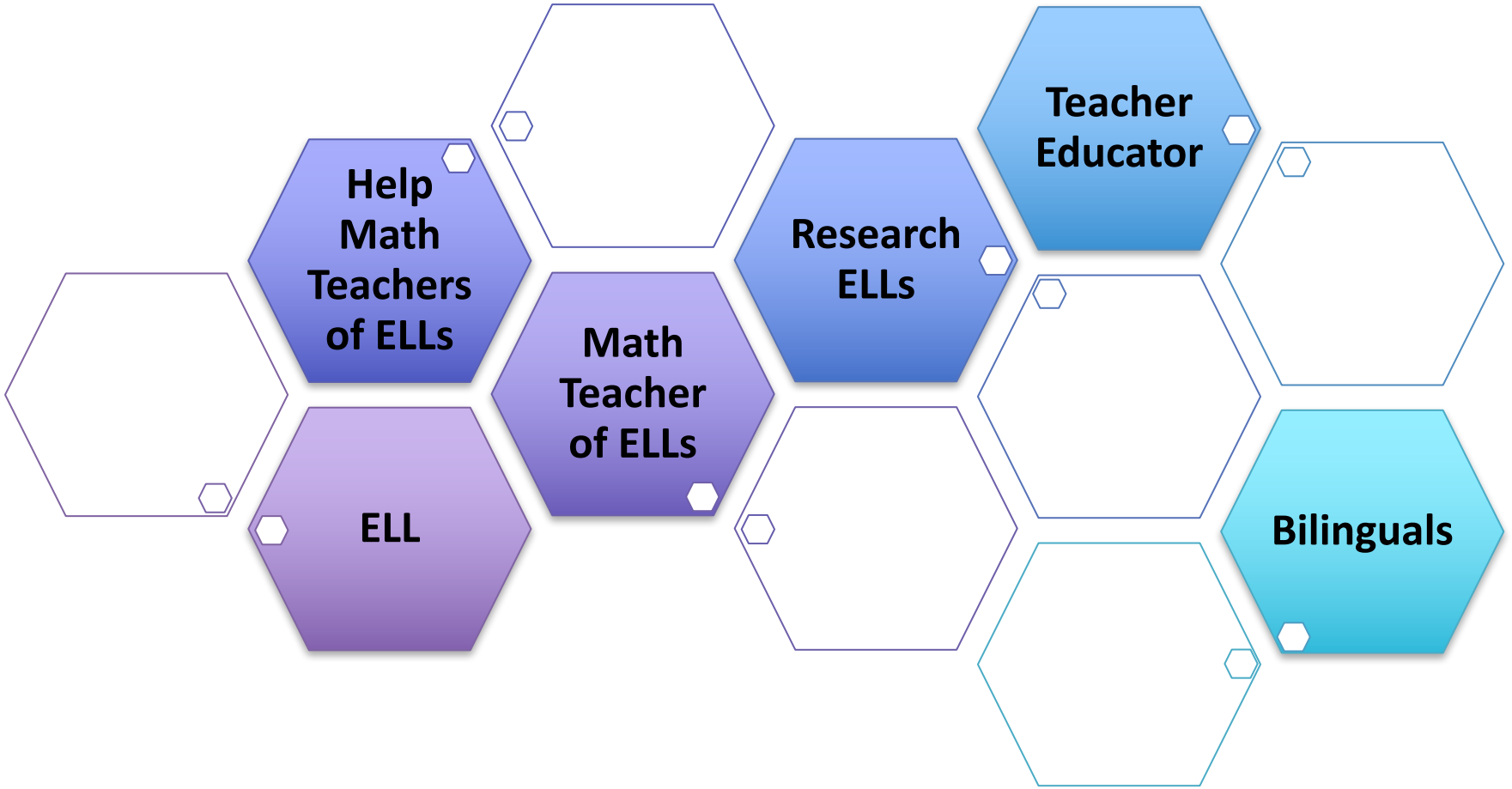
Innovative Online Course for Math Teachers:

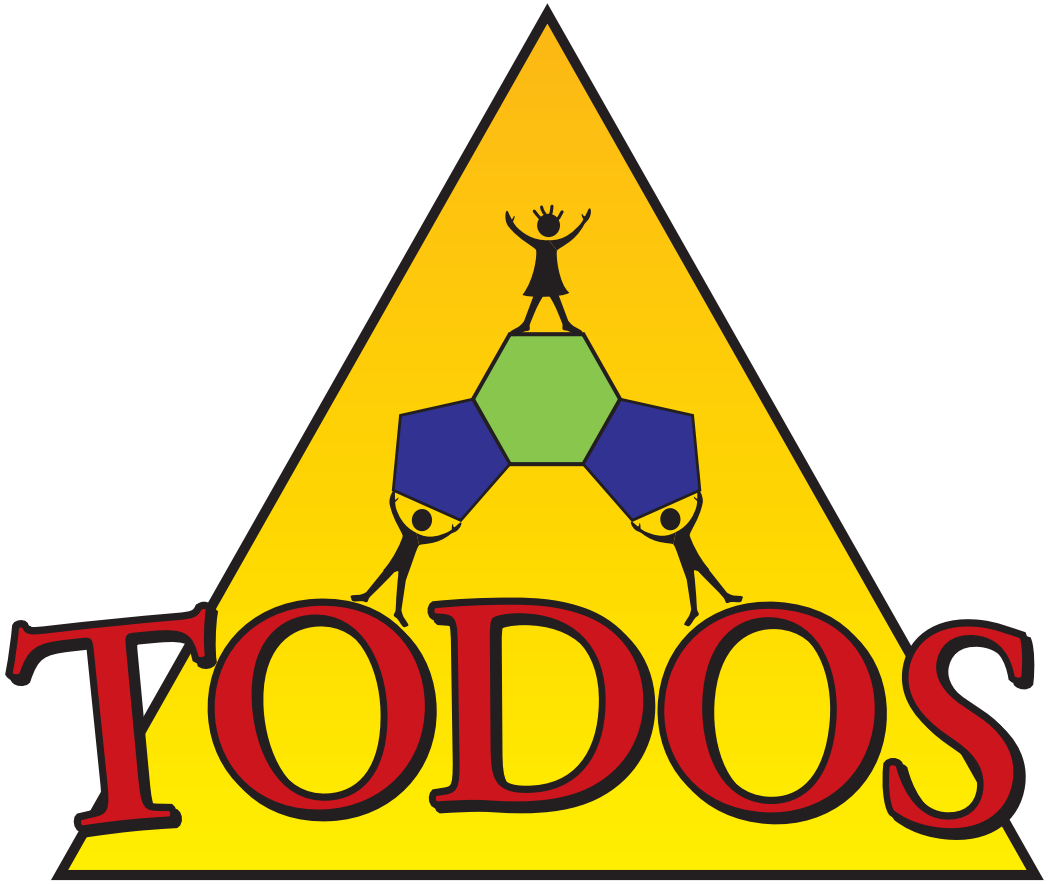
How to Teach ELLs?



Ji-Yeong I, Ricardo Martinez, Iowa State University

About Us


Help Math Teachers of ELLs
Math Teacher of ELLs
Research ELLs
Teacher Educator
ELL
Bilinguals



Mathematics for ALL

Five Good Reasons to Become a TODOS Member!

- Targeted and ongoing support in your efforts with students.
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- High quality and rigorous mathematics emphases for ALL students.
- Engagement with a community of learners at all levels of education.
- Ideas to work with underserved students in mathematics.

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EXHIBIT

Visit the TODOS Exhibit

Booth 648

Renew/join at Booth 648 or online at http://www.todos-math.org
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Mathematics for ALL
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It's ALL about ALL Students
Learning Quality Mathematics:
Advocating for Equity and Social Justice
TODOS: Mathematics for ALL
Scottsdale Plaza Resort, Phoenix Metropolitan Area

100% Online
ELL Math Education Course

About Online Course

2017-Q1

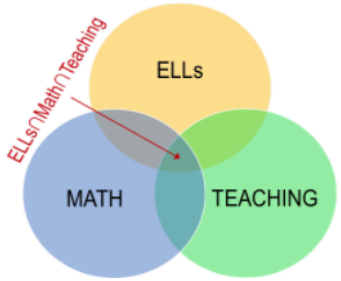
- **Home**
- Announcements
- Math-ELL Team
- Syllabus
- Course Readings
- Tools and Other Resources
- Course Calendar
- Discussions
- Assignments
- Grades
- Pages
- People
- Files
- Quizzes
- Outcomes
- Collaborations
- Conferences
- Modules
- Settings

Teaching Math to English Language Learners

Edit

Thank you for registering for this course. We hope you all enjoy this journey.

Meet the MATH-ELL Team



- Canvas Network
- 3 types of Students:
  - Free
  - In-service Teachers
  - Preservice teachers

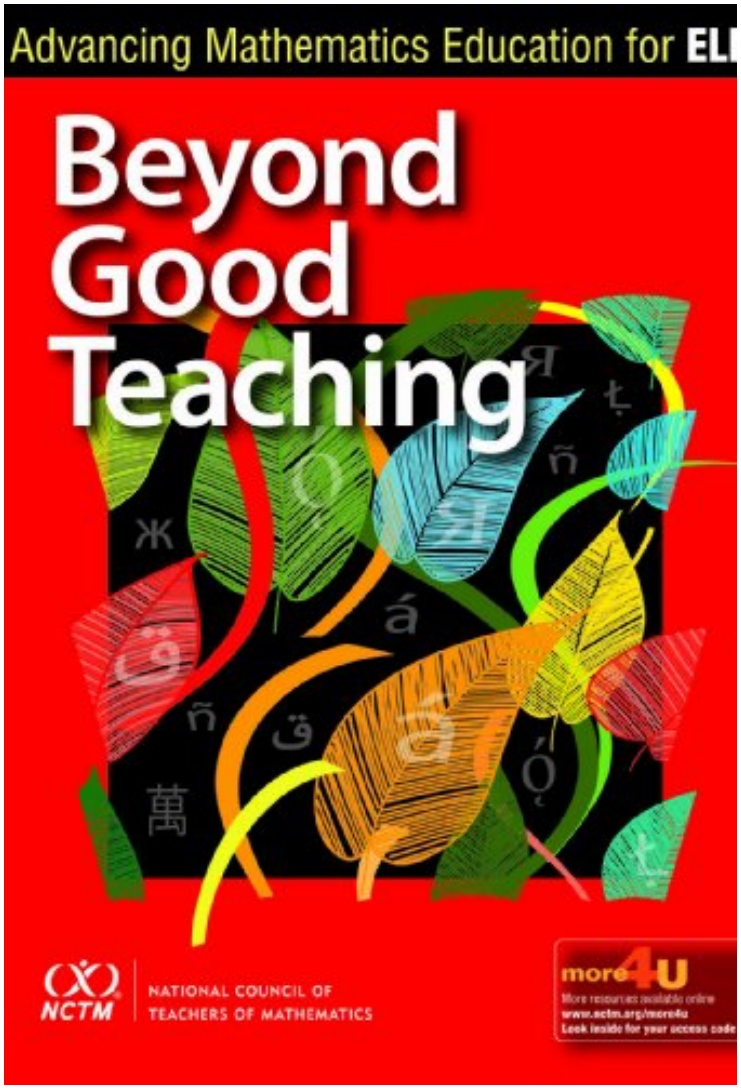
This course is designed for pre-service/in-service teachers and others who will work or work with K-12 students who have linguistically and culturally diverse backgrounds, especially students of other languages (English language learners). The main focus of this course is helping teachers understand the needs of various English language learners (ELLs), learn to use ELLs' language and culture as a resource in mathematics classrooms, and implement research-based instructional strategies that are effective to teach mathematics for ELLs.

To get started, visit Module 0: Get Started.

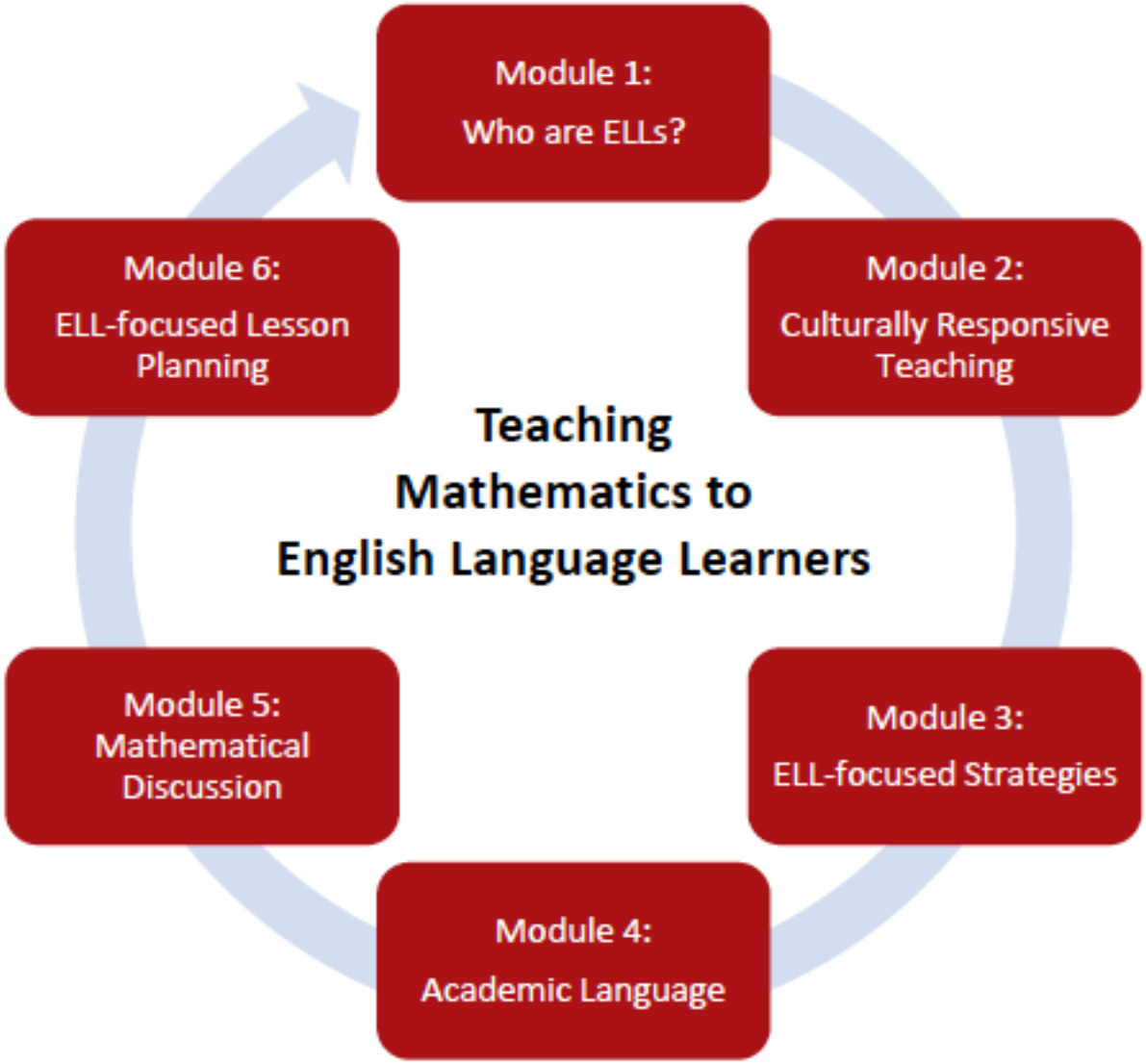
MODULE 0: GET STARTED		
MODULE 1: WHO ARE ELLs?	MODULE 2: CULTURALLY RESPONSIVE TEACHING	MODULE 3: ELL-FOCUSED STRATEGIES

Textbook

Celedon-Pattichis, S., & Ramirez, N. G. (Eds.). (2012). *Beyond good teaching: advancing mathematics education for ELLs*. Reston, VA: National Council of Teachers of Mathematics.



Modules


Module 1:
Who are ELLs?
Module 2:
Culturally Responsive Teaching
Module 3:
ELL-focused Strategies
Module 4:
Academic Language
Module 5:
Mathematical Discussion
Module 6:
ELL-focused Lesson Planning
Teaching Mathematics to English Language Learners

Outcomes

1. Understand various needs and capabilities of ELLs in learning mathematics.
2. Treat ELLs' languages as a resource, not a deficit and learn to use multiple modes of communication.
3. Implement research-based strategies to teach ELLs in order to maximize their learning through cognitively demanding mathematical activities and differentiate teaching practice corresponding to their ELLs.
4. Support ELLs' participation in mathematical discussion as they learn English.

Activity: Perspective

Predict the percentage of children solving each problem and using a valid strategy:

Problem structure	Problem	Correct answer (%)	Valid strategy (%)
Separate (result unknown)	Paco had 13 cookies. He ate 6 of them. How many cookies does Paco have left?		
Join (change unknown)	Carla has 7 dollars. How many more dollars does she have to earn so that she will have 11 dollars to buy a puppy?		
Compare (difference unknown)	James has 12 balloons. Amy has 7 balloons. How many more balloons does James have than Amy?		
Multiplication	Robin has 3 packages of gum. There are 6 pieces of gum in each package. How many pieces of gum does Robin have altogether?		
Measurement division	Tad had 15 guppies. He put 3 guppies in each jar. How many jars did Tad put guppies in?		
Partitive division	Mr. Gomez had 20 cupcakes. He put the cupcakes into 4 boxes so that there were the same number of cupcakes in each box. How many cupcakes did Mr. Gomez put in each box?		
Measurement division with remainder	19 children are going to the circus. 5 children can ride in each car. How many cars will be needed to get all 19 children to the circus?		
Multistep	Maggie had 3 packages of cupcakes. There were 4 cupcakes in each package. She ate 5 cupcakes. How many are left?		
Multistep	19 children are taking a mini-bus to the zoo. They will have to sit either 2 or 3 to a seat. The bus has 7 seats. How many children will have to sit three to a seat, and how many can sit two to a seat?		

(From Thomas P. Carpenter, Ellen Ansell, Megan L. Franke, Elizabeth Fennema, and Linda Weisbeck, "Models of Problem Solving: A Study of Kindergarten Children's Problem-Solving Processes, *Journal for Research in Mathematics Education* 24 (November 1993), pp. 428–41; all rights reserved.)

Post-assessment results for students studied by Turner, Celedón-Pattichis, and Marshall (2008) and Carpenter et al. (1993)

Results						
	Turner, Celedón-Pattichis, and Marshall (2008) (n = 45)			Carpenter et al. (1993) (n = 70)		
Problem structure	**Numbers**	**Correct answer**	**Valid strategy**	**Numbers**	**Correct answer**	**Valid strategy**
Join Result Unknown	6, 6	80%	100%	n/a	n/a	n/a
Separate Result Unknown	13, 5	73%	100%	13, 6	73%	89%
Join Change Unknown	7, 11	56%	93%	7, 11	74%	80%
Multiplication	3, 6	49%	93%	3, 6	71%	86%
Partitive Division	15, 3	42%	73%	20, 4	70%	70%
Measurement Division	10, 2	40%	73%	15, 3	71%	73%
Compare	9, 12	24%	73%	7, 12	67%	71%
Multi-Step	2, 4, 3	44%	60%	3, 4, 5	64%	67%
Measurement Division with Remainder	15, 4	27%	67%	19, 5	64%	64%

(Adapted from Turner, Celedón-Pattichis, and Marshall [2008], p. 15.)

Sample Responses

- I made predictions with lower expectations because the students were ELL. I see non-ELLs daily struggle with these types of word problems and I assumed that ELLs would have even more difficulty. The fact that the students were Latino/Latina ELLs did not affect my prediction, only the fact that they were ELLs.
- I did not retain as high expectations. I assumed that because they were ELL students they would not have as high accuracy rates as other students. I thought that they may have the correct answer, but have not used a valid strategy.

Discussion

This question is what I have heard from many teachers. “I have 20 ELLs who came from all different countries so they speak all different languages and have different cultures. How can I culturally respond to these students?” We know it’s not possible to know all 20 cultures and languages. Then, what would you do to teach math for them?

Some Responses

- I would start by developing a community in my class that respects the differences of all and shows an interest in getting to know people.
- Create opportunities for the students to teach you and their peers about their culture and language.
- I think that acknowledging that you don't know all the cultures and languages is important. Tell the students that you don't know much about their culture or language and make learning about each others culture/language part of the classroom experience. Take turns tailoring projects/problems to individual students so that you will eventually hit on all the cultures represented.

Brainstorming: Strategies

Which strategy, if any, would work well for ELLs at the beginning stage (e.g., newcomers) but may not work well for ELLs at the advanced stage and vice versa? Explain your thinking based on your experience (if any).

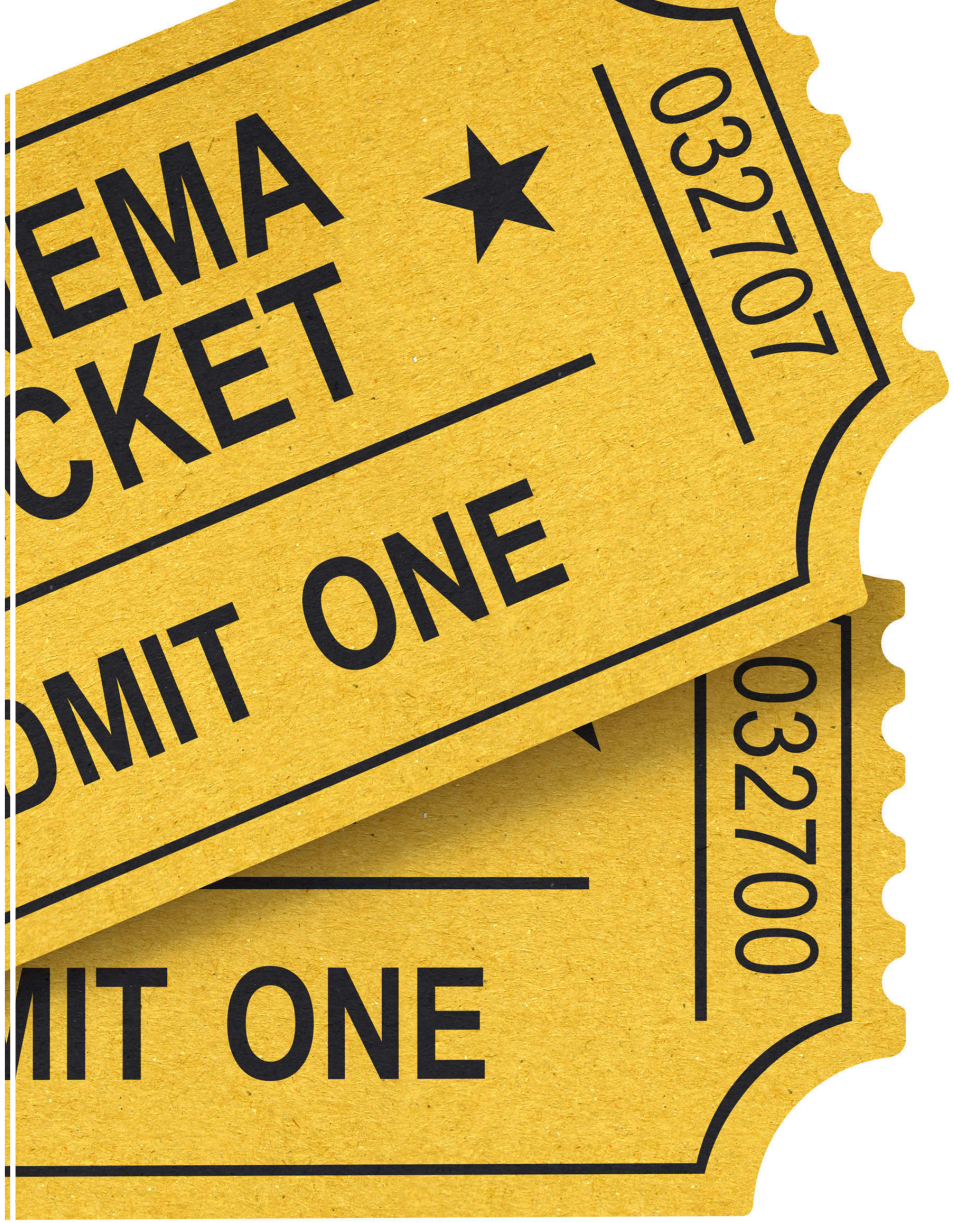
Activity: Strategies

Module 4: Word problem

Choose a one-word problem from your textbook (or curriculum) and analyze it using the Framework for Analyzing Word Problem. Submit the Framework for Analyzing Word Problem you filled out.

Sample Math Problem

Three sisters attended a movie that cost $5 per person. Each sister spent $2 on popcorn. Their mother gave them $30 to spend for all three. How much money was left?



Sample Analysis Table

Information Provided	Mathematical Concepts	Mathematical Representations and Procedures
Clause 1: Three sisters attended a movie that cost $5 per person.	Number of sisters = 3 Price of movie per person = $5	$5 + $2 = $7 $7 × 3 = $21
Clause 2: Each sister spent $2 on popcorn.	Each sister = 1 Money spent on popcorn for each sister = $2	**Clause 1 Representation** Sister 1 $5 Sister 2 $5 Sister 3 $5 } $15 on movies **Clause 2 Representation** movie popcorn Sister 1 $5 $2 Sister 2 $5 $2 Sister 3 $5 $2 } $21 on movies and popcorn
Clause 3: Their mother gave them $30 to spend for all three.	Total money they had = $30	$30 – $21 = $9 money the mother gave $30 money the sisters spent $21

Your Turn

Marshall is making a big batch of macaroni and cheese for his family reunion. The original recipe calls for 3 pounds of pasta and serves 10 people. Marshall's family reunion will have 50 people. How many pounds of pasta does Marshall need to buy?

Information Provided	Mathematical Concepts	Mathematical Representations and Procedures

C. Information Provided, Mathematical Concepts, and Mathematical Representations and Procedures in Word Problem

Information Provided	Mathematical Concepts	Mathematical Representations and Procedures
Marshall is making a big batch of macaroni and cheese for his family reunion.	(none)	(none)
The original recipe calls for 3 pounds of pasta	Recipe= 3 pounds of pasta	1 pound of pasta 1 pound of pasta 1 pound of pasta One recipe
And serves 10 people.	Recipe= serves 10 people	1 pound of pasta 1 pound of pasta 1 pound of pasta Serves 10
Marshall's family reunion will have 50 people.	Number of people= 50	1 pound of pasta 1 pound of pasta 1 pound of pasta Serves 10 1 pound of pasta 1 pound of pasta 1 pound of pasta Serves 10 1 pound of pasta 1 pound of pasta 1 pound of pasta Serves 10 1 pound of pasta 1 pound of pasta 1 pound of pasta Serves 10 1 pound of pasta 1 pound of pasta 1 pound of pasta Serves 10 + + 15 pounds of pasta= Serves 50

Sample Response

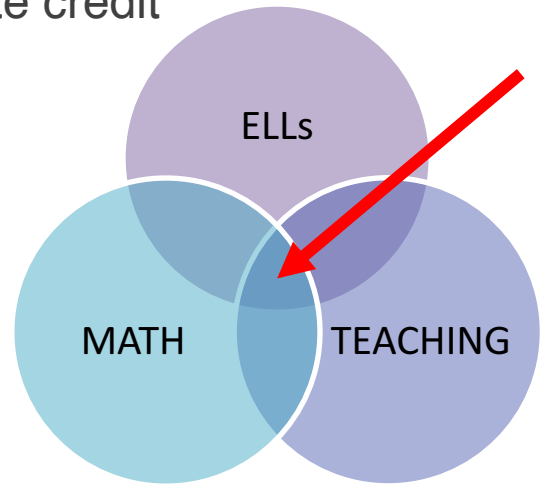
Discussion & Reflection

1. How do you think the activities shared in this presentation can help in-service and pre-service teachers support ELLs to learn mathematics?

2. What additional content do you think should be added to this online course?

100% Online
ELL Math Education Course
Iowa State University

- ***Teaching Mathematics to English language learners***
- Available in Spring and Summer
- Available for license renewal credit and graduate credit
- Choose to earn 1, 2, or 3 credits
- Math-focused
- Strategy-focused



Q&A

"I'm afraid I still have more questions than answers."

Questions? Comments? Feel free to contact us:

Ji Yeong I (jiyeongi@iastate.edu)

School of Education, Iowa State University