Content-Based Math Instruction for Secondary English Learners

Note: This course is now archived and no longer actively moderated by an instructor. The syllabus (including assignment due dates) is provided here as a reference.

Course Description

This course focuses on the theory and practice of teaching mathematics content to secondary English learners (ELs). It examines various strategies for building background knowledge and developing mathematics vocabulary, as well as reading and writing strategies that can be used in the mathematics classroom. We will also examine various cooperative learning strategies to enhance comprehension of mathematical concepts. The final project will be a student-designed mathematical unit using content and language objectives enhanced by specific linguistic and learning strategies that are learned in this course. This unit will contain three EL lesson plans that are aligned with standards-based instruction (SBI) for enhancing literacy in mathematics. Participants will also create a portfolio of ideas and strategies for ELs that they could share with other team members in their school.

Student Learning Outcomes

Participants will be able to:

- Understand the basics of the language acquisition process and the linguistic needs of second language learners
- Examine the connections between standards-based instruction and ELs
- Analyze and write content and language objectives for the mathematics classroom as part of a coherent lesson plan
- Write a lesson plan that illustrates an understanding of academic English, language acquisition, and language teaching strategies in the mathematics classroom
- Incorporate background knowledge strategies as well as reading strategies for the mathematics classroom into their lesson plans
- Use scaffolding strategies to enable students to write like mathematicians

Course Assignments

Module 1

1. Introduce yourself to each other. For each letter of your first name, give a related math term. (E.g., Carol = circumference + area + radius + octagon + length)
2. Reflect on the PowerPoint presentation "Why Teach Literacy in Mathematics" For example, "I used to think mathematics teaching…, but now I know…" or "…now I am thinking about two new ideas."

Module 2

Reflect upon the differences between language and content objectives and how you might use them in your classroom.

Module 3

1. Apply what you learned! Implement two of the math vocabulary strategies described in the article.

Choose one of the activities below and submit for grading.

2. Use the Education Connections Lesson Plan Template to add vocabulary strategies to a specific lesson plan with content and language objectives. Submit this lesson plan for grading.
3. On the Education Connections Lesson Plan Template, complete the Modify section where you are using the four domains to teach vocabulary. Submit this lesson plan for grading.

Module 4

After watching the PowerPoint presentation and reading the article, write a few sentences commenting on which strategies you will now use (or have used before) in the math classroom to differentiate lesson plans. Describe your new insights and their implications. Write and submit one real-life word problem to share with other participants. Comment on the practical applications of this problem. Which unit would you use it in?

Module 5

1. Adapt one of your existing mathematics lessons in sequence based on your grade and the CA ELD standards or the WIDA standards. Use the Lesson Plan Template. Submit this completed mini-unit for grading.
2. Write a one-page reflection on how your thinking and practice have changed as a result of this course. Use the questions at the end of the lesson plan template as a guide for writing. Include a description of how you can better serve the ELs in your classroom. Submit this document for grading.

Suggested Course Schedule and Due Dates

Each module is comprised of two weeks, with all modules beginning on a Wednesday and ending on a Tuesday at midnight. Please use the following schedule as a guide to completing the course.

Module 1:
Weeks 1 & 2

Module 2:
Weeks

Module 3:
Weeks 5 & 6

Module 4:
Weeks 7 & 8

Module 5:
Weeks 9 & 10

Course Structure and Grading

The course consists of five modules and runs for ten weeks. Each module will require approximately a 3-hour commitment. While the original instructor has indicated *recommended* submission dates for the assignments, the final date of the course is at your leisure. We suggest that you complete your assignments in a consistent and timely manner across the course.

Educational Activity	Hours Student Engaged	Explanatory Comments (if any)
Assigned Readings	12	
Project	7	
Online Interaction	12.5	
Field Work, Experience	8.5	
Total Hours:	40	

WEEKS	TOPIC	OUTCOME	READINGS	ASSIGNMENTS AND DUE DATES
1-2	What you always wanted to know about the language acquisition process and standards-based instruction	Participants will be able to discuss the basics of the language acquisition process and standards-based instruction as it relates to the teaching of secondary mathematics.	• Lesson Plan Template and Four Strands of Sheltered Instruction • PowerPoint presentation: Why Teach Literacy in Mathematics? • Center for Applied Linguistics. (2014). Seven principles of effective instruction for English learners. Retrieved from http://www.cal.org/solutions/pdfs/video/seven-principles-of-effective-instruction-for-english-learners-english-and-spanish-version.pdf **Optional Reading** • Duguay, A., Massoud, L., Tabaku, L., Himmel, J., & Sugarman, J. (2013). Implementing the Common	**Recommended** • Introduce yourself to each other. For each letter of your first name, give a related math term. (E.g., Carol = circumference + area + radius + octagon + length) • Reflect on the PowerPoint presentation "Why Teach Literacy in Mathematics" For example, "I used to think mathematics teaching…, but now I know…" or "…now I am thinking about two new ideas."

			Core for English learners: Responses to Common Questions. Washington, DC: Center for Applied Linguistics. Retrieved from www.cal.org/resource-center/briefs-digests/briefs • Robertson, K., & Ford, K. (2008). Language acquisition: An overview. Retrieved from http://www.colorincolorado.org/article/2675 • Colorín Colorado. (2007). What is the difference between social and academic English? Retrieved from http://www.colorincolorado.org/educators/background/academic • http://www.colorincolorado.org/common-core Choose a section to read under the Heading "What You'll Find in This Section." For example, if you click on "Common Core Basics: ELLs," you will find some explicit resources	

			to scaffold learning for ELs.	
3-4	Writing content and language objectives for the mathematics classroom	Participants will be able to • develop, define, refine, communicate, and assess content and language objectives for every lesson. • ensure objectives derive from and are aligned with English language proficiency (ELP), or WIDA, as well as content standards.	• PowerPoint presentation: Writing Content and Language Objectives • Robertson, K. (2009). Math instruction for English language learners. Washington, DC: Colorín Colorado. Retrieved from http://www.colorincolorado.org/article/30570/ • Education Connections Lesson Plan Template	**Recommended** • Reflect upon the differences between language and content objectives and how you might use them in your classroom.
5-6	• Using vocabulary strategies in the math classroom to enhance academic English as well as first language supports • Differentiate instruction through lesson adaptation and	Participants will be able to implement various vocabulary strategies in their classroom by differentiating instruction, scaffolding instruction, and identifying the language domains and demands embedded in the lessons.	• PowerPoint presentation: The Importance of Vocabulary Instruction • Austin Independent School District (2015). Building a bridge to academic vocabulary in mathematics. AISD Elem.(*appropriate for secondary also*). Retrieved from: http://mrwaddell.net/blog/uploadpics/Made4MathVocab--Reading-in-Math-	**Recommended** • Apply what you learned! Implement two of the math vocabulary strategies described in the article. • Choose one of the activities below and submit for grading. • Use the Lesson Plan Template to add vocabulary strategies to a specific lesson plan with content and language objectives. Submit this lesson plan

	instructional modifications		research_116CA/ Building.a.bridge.to.Academic.vocab.in.math.pdf	for grading. • On the Lesson Plan Template, complete the Modify section where you are using the four domains to teach vocabulary. Submit this lesson plan for grading.
7-8	Applying background knowledge, and reading and writing strategies in the math classroom	Participants will be able to • apply reading and writing strategies in the math classroom. • promote language use through interaction with peers, teachers, and the core content. • implement activities that require use of all four domains.	• PowerPoint presentation: Reading and Writing in the Math Classroom • Scholastic.com. (n.d.). 10 ways to help ELLs succeed in math. Retrieved from http://www.scholastic.com/teachers/article/10-ways-help-ells-succeed-math **Optional Reading:** • Aguirre-Muñoz, Z. (2011). STEM for English learners. AccELLerate!, 3(4), 10-12. • Center for Applied Linguistics. (n.d.). SIOP math tip. Washington, DC: Author. Retrieved from	**Recommended:** • After watching the PowerPoint presentation and reading the article, write a few sentences commenting on which strategies you will now use (or have used before) in the math classroom to differentiate lesson plans. Describe your new insights and their implications. • Write and submit one real-life word problem to share with other participants. Comment on the practical applications of this problem. Which unit would you use it in?

			http://www.cal.org/create/pdfs/siop-math-tip-final.pdf STEMCollaborative.org. (n.d.). Retrieved from http://www.stemcollaborative.org **Search this website for real-life situations where mathematics can be applied**	
9-10	Final project	Participants will be able to develop connected mathematics lesson plans and incorporate the literacy strategies they have learned.	• Lesson Plan Template and Four Strands of Sheltered Instruction. • Keystone Area Education Agency. (2015). Math vocabulary. Retrieved from https://www.keystoneaea.org/classroom-support/math/ell-math-vocabulary **Optional:** • May choose to use web-based resources that you have researched plus multiple web-based resources that you have learned about during this course.	**Recommended** • Adapt one of your existing mathematics lessons in sequence based on your grade and the CA ELD standards or the WIDA standards. Use the Lesson Plan Template. Submit this completed mini-unit for grading. • Write a one-page reflection on how your thinking and practice have changed as a result of this course. Use the questions at the end of the lesson plan template as a guide for writing. Include a description of how you can better serve the ELs in your classroom. Submit this document for grading. *