Texas Workforce Commission

Adult Education and Literacy

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Handout

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Day 2, Session 2

TELLTx: Integrating Math into ESL Instruction

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Session Description: This is a hands-on session incorporating several activities and group work. Discussions include why math is important in ESL classrooms, where math is found in daily life, disciplinary language and instructional strategies. Activities include comparison of math words and

everyday word meanings, and group discussion of incorporating math into ESL instruction.

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TELL TX Workshops:

Professional Development

- Using Rubrics in the ESL Classroom
- Google Classroom for ESL Learners
- Introduction to Technology Apps for the ESL Classroom
- Integrating Math into ESL

Objectives

By the end of this workshop, you will be able to answer the following essential questions:

- Why do we include math in ESL Classes?
- What is different about math for Adult ELLs?
- What is the role of language in math instruction?
- How do we integrate math instruction into the ESL classroom?

Why Math?

This photo is a "flea market" activity where students practiced assigning and negotiating prices, calculating totals, writing checks, and writing receipts. There are three basic reasons why math should be included in ESL instruction. Even if your students only want to learn English, part of that is being able to communicate about math in English.

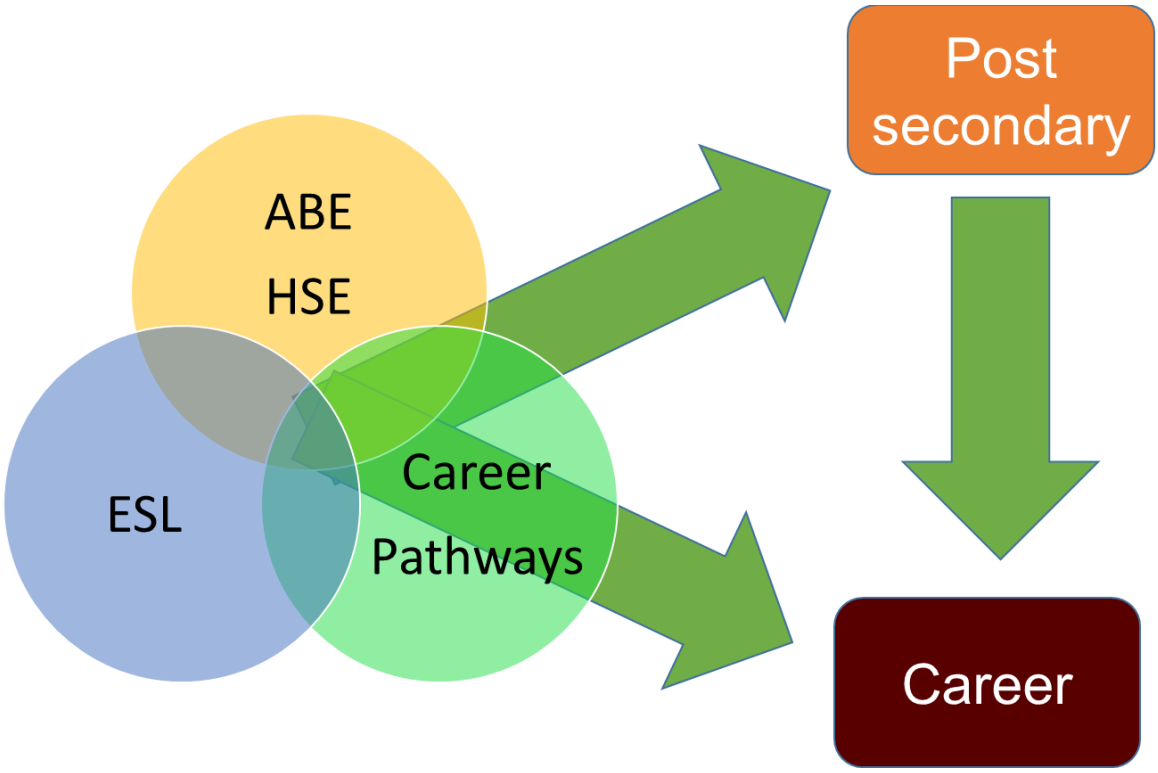
Here's why...

- WIOA requires it! (H.R. 803, Title 2, Sec. 202.4.A.ii)
- WIOA defines literacy as:

- "an individual's ability to read, write, and speak in English, compute and solve problems, at levels of proficiency to function on the job, in the family of the individual, and in society."

- ESL classes are tasked with helping participants improve all aspects of the definition of literacy.

Transitions from the beginning: Where will they go after our class?



Math is in the intersection of the three circles. There may not be as much math in ESL, but it will be required in the ABE/HSE, and in Career Pathways. No matter what the student's math level is, there needs to be a language of math from the beginning.

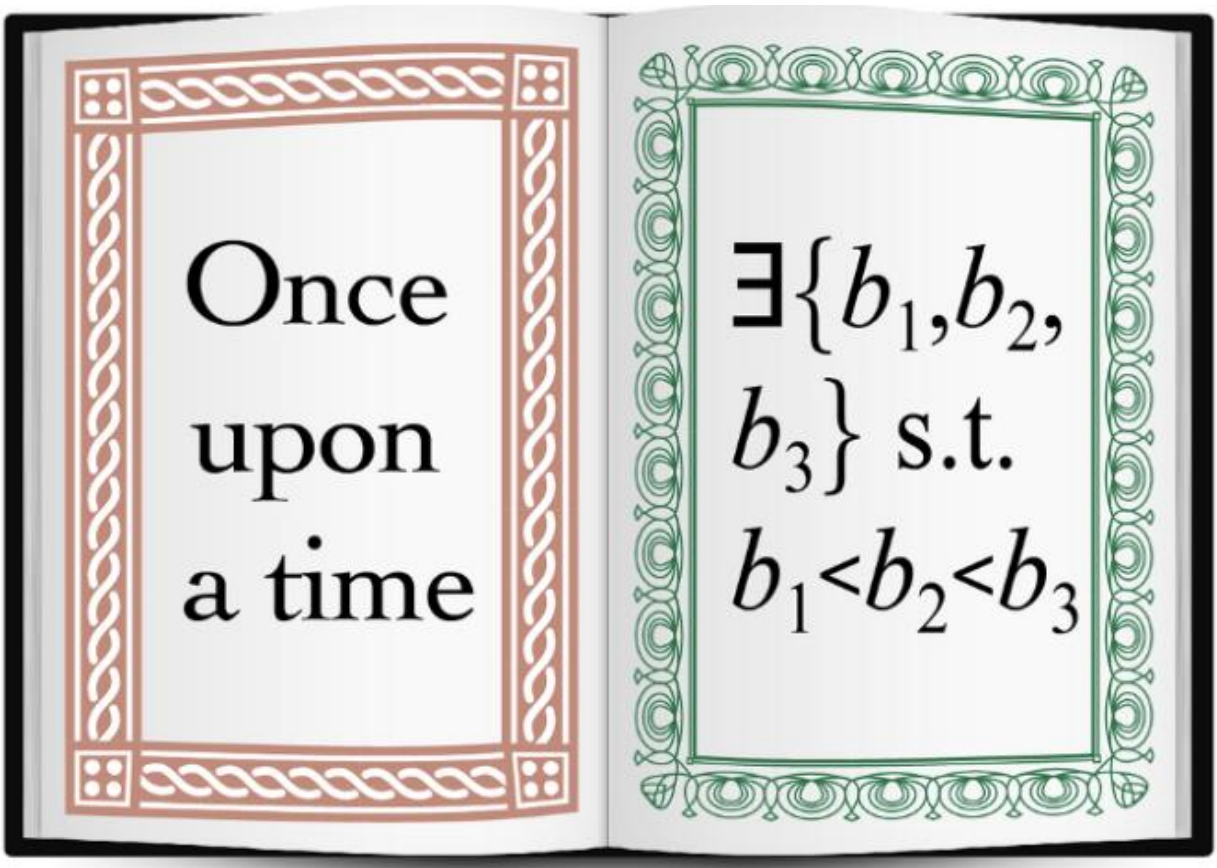
They use math in their daily lives.

Brainstorm Activity: Participants will answer a poll using PollEverywhere. Question: Why should you include math in regular ESL Classes?

Where do we find math?

Activity Discussion: Presenter will pick a "Why" from the poll answers submitted and provide examples of where it appears in daily life.

Considering Disciplinary Language



Mathematics is a language. We should teach it that way. To solve the problems of math education, we should study how language education solves the same problems.

Teaching of math is the same as teaching other subjects – it has a language. Math is an academic discipline. Math is often said to be a language. So, it follows that Math is a disciplinary language.

The image above illustrates this idea. The right page uses mathematical language to imply the same idea that the left page conveys in English. (Starting here…) The quote emphasizes that what we are focusing on is the language, not the skill and knowledge.

A Quick Review of BICS & CALP

BICS (Basic Interpersonal Communicative Skills)

- 0-3 years to develop in the second language (L2)
- Language proficiency for everyday communicative contexts
- Occurs in meaningful social contexts
- Often includes slang, idioms, colloquial speech

CALP (Cognitive Academic Language Proficiency)

- 5-10 years to develop in the second language (L2)
- Language use in decontextualized academic situations
- Requires time and support (scaffolding)
- Language necessary for academic success
- Unlimited in nature
- Skills, ideas, and concepts transfer from L1 to L2

The big idea here is that some language belongs to common everyday communication (BICS), and some belong to particular "academic disciplines" (CALP) with math being one of the disciplines.

Workplace Language

Similar to CALP this is the language that is used at the workplace to talk about work related topics and idea to coworkers and other in the same industry. It can be viewed as a non-academic extension of CALP that is specific to an industry or type of work instead of Academic Disciplines.

There are some common workplace words but many of them are specific to the industry or type of work. BICS and CALP are disciplinary language

terms; workplace language is close to CALP. The "jargon" used in any industry.

Identifying BICS, CALP, and Workplace Language

Activity: Sort the words below into the 3 categories: BICS, CALP, and Workplace Language.

Cash	Good morning	Agree
Multiplication	Commutativity	Approximate
Resume	Decimal	Dozen
Polygon	Finance	Night shift
Symmetry	Overtime	Correlation
Investigate	Round	Significance

This is not meant to be a right or wrong exercise; it is so you can play with the idea of what category of language a word may belong. The rationale of why you placed the word in the diagram is the important part.

Group Activity: work through each word as a group activity to identify and label with a B, C or W

How does BICS/CALP apply to math in ESL?

Activity: Define the follow terms in the given context

Term	Everyday use	Math
angle		
mean		
table		
volume		
area		
gross		
operation		
degree		
expression		
power		
odd		
even		
prime		

For this activity, participants will define each term on the table in the context of everyday use(BICS) and the context of Math (CALP). Participants have about 5 minutes to jot done their definition, then go through them as a group.

Try This

Math does not look the same in all countries. Here are some examples of ways to look at commas, decimals and division.

Write this number out in word form: 9,300

- ninety-three hundred
- nine thousand three hundred
- Nine and three hundred thousandth
- nine-point three

Solve this equation.

Be prepared to explain your work.

- 74÷3=24 with a reminder of 2
- 74/3 = 24 1/37
- 74/3 = 24.46

English Standard Units of Measure

Length	Weight	Fluid volume
Inch	Ounce	Gallon
Foot	Pound	Quart
Yard	Ton	Pint
Mile		Cup

Not to mention: (And those are just the common units)

- Acre

- Fahrenheit
- Fluid ounces
- Peck
- Bushel

The majority of the world uses the metric system of measurement, so your students may not be familiar with English standard units of measure. The table shows the most common units, and the bullet list below shows some less common but still used units.

How Do We Put Math into ESL Curriculum/ Lessons?

Consider:

- Using a "Themed" approach
- Writing it into the objective
- Aligning instruction with adult education content standards.

Traditional math instruction is broken down into the topics listed below.

- Numbers & Operations
- Measurement
- Geometry
- Data Analysis & Probability
- Algebra with concrete, pictorial, and symbolic representation
- Problem-solving strategies

How do we address them in ESL? Or do we?

The topics list on listed above is a typical way that math instruction is chunked.

We are asking a question here, but we don't want to go into the weeds answering it. The typical answer is, "if we do, it is not intentional." The question implies that we should address these topics, but we are not talking about teaching these topics. The goal is to make sure that the student has the language necessary to engage in these math topic areas. If students lack those math skills, then it is likely that they will transition into a class where teaching these topics is a learning objective.

Math Topics

- Numbers & Operations
- Measurement
- Geometry
- Data Analysis & Probability
- Algebra with concrete, pictorial, and symbolic representation
- Problem-solving strategies

Think about where these math topics show up in your students' everyday life and how you address them through ESL instruction

- come up with at least one example for each math topic

Break out room activity: Assign each of the items from the list on each page. Each group brainstorm examples of where these math concepts show up in your life and write them on paper. Each group has 5-10 minutes.

Instructional Strategies

- Provide for peer-group collaboration.
- Integrate math skill needs and functional needs.
- Include possibilities for more than one way to solve the same problem.
- Offer "Think Aloud" modeling of ways to solve problems.
- Encourage students to relate mathematical learning to their own lives.
- Include math/numeracy instruction from the beginning.
- Use graphic organizers, manipulatives, games and realia.

These are all standard instructional strategies but are being presented in the context of integrating math concepts with language acquisition.

The big ideas are:

- Engage math and numeracy concepts where they are found while learning English.
- Be aware of the students' math skills and functional level. Separate the math skills educational functioning level from their language skills and educational functional levels and adjust instruction accordingly. (Is the barrier a math problem, a language problem, or both?)
- Engage mathematical concepts from a problem-solving perspective centered on authentic, real-life examples as they learn the language skill involved in the same context.