A Pathway to Equitable Math Instruction

SEAD Theme Guidebook: Belonging

STRIDE

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Belonging SEAD Theme Guidebook
Belonging for Mathematics Grade 6–8

Definition of Belonging:

- *"Belonging is a sense of fitting in or feeling like you are an important member of a group." (vocabulary.com)*
- *"To be a member of (a club, organization, etc.)." (Merriam Webster Learner's Dictionary)*

The Collaborative for Academic, Social and Emotional Learning (CASEL) defines the characteristics of Belonging:

- **Self-Awareness**: The ability to accurately recognize one's own emotions, thoughts, and values and how they influence behavior. The ability to accurately assess one's strengths and limitations, with a well grounded sense of confidence, optimism, and a "growth mindset."

- **Social Awareness**: The ability to take the perspective of and empathize with others, including those from diverse backgrounds and cultures. The ability to understand social and ethical norms for behavior and to recognize family, school, and community resources and supports.

- **Responsible Decision-Making**: The ability to make constructive choices about personal behavior and social interactions based on ethical standards, safety concerns, and social norms. The realistic evaluation of consequences of various actions, and a consideration of the well- being of oneself and others.

- **Self-Management**: The ability to successfully regulate one's emotions, thoughts, and behaviors in different situations—effectively managing stress, controlling impulses, and motivating oneself. The ability to set and work toward personal and academic goals.

- **Relationship Skills**: The ability to establish and maintain healthy and rewarding relationships with diverse individuals and groups. The ability to communicate clearly, listen well, cooperate with others, resist inappropriate social pressure, negotiate conflict constructively, and seek and offer help when needed.

In addition, CASEL describes the characteristic of belonging *in mathematics* as also including:

- Examine what it means to belong to a group or community, including how ethnicity and race impacts one's sense of self and beliefs. (A healthy sense of ethnic-racial identity is important for psychological, academic, and social well-being.)
- Engage in initiatives and to co-create solutions that are inclusive, equitable, and mutually supportive.

Standards for Mathematical Practice[1]

SMP 2: Reason abstractly and quantitatively.

(SOME CONNECTION WITH BELONGING)

Mathematically proficient students in middle school represent a wide variety of real world contexts through the use of real numbers and variables in mathematical expressions, equations, and inequalities. They are able to contextualize to understand the meaning of the number or variable as related to the problem. They decontextualize to manipulate symbolic representations by applying properties of operations. For example, utilize a “which one doesn't belong?” activity for groups of students to discuss and analyze correspondences between graphs, tables, and equations that represent a relationship between dependent and independent variables. *(Priority Instructional Content in ELA/Literacy and Mathematics, Student Achievement Partners)*

[1] “Overview of the Standards Chapters of the Mathematics Framework for California Schools,” California Department of Education, 2015, https://www.cde.ca.gov/ci/ma/cf/documents/mathfwoverview.pdf.

Sample Actions / Instructional Strategies Related to Belonging and SMP 2

Example referenced from Student Achievement Partners document:

- **Build a safe community** where mathematical discourse supports active listening, promotes diverse perspectives and insights, and allows students to consider others' reasoning to advance their own mathematical understanding. (SAP document)
- Utilize a "which one doesn't belong?" activity for **groups of students** to discuss and analyze correspondences between graphs, tables, and equations that represent a relationship between dependent and independent variables. (SAP document)

Examples referenced from "Kansas Math Standards Flipbook":

- A good math task contains **relevant**, realistic content.

Examples referenced from "Supporting ELLs in Mathematics":

- Language in mathematics classrooms includes **multiple**:
  - Representations (objects, pictures, words, symbols, table, graphs).
  - Models (oral, written, receptive, expressive).
- Create **multiple** instructional pathways that provide students with **different** academic and linguistic backgrounds access to, engagement with, and achievement of standards.
- Facilitate students' production of **different** kinds of reasoning (algebraic, geometric, statistical, etc.) and comparison of reasoning.
- Facilitate students' participation in **different** kinds of participant structures—from informal, collaborative group interactions to formal presentations—in ways that allow them to use their **own** existing linguistic resources and collaborate with others to articulate ideas, interpret information, and present and defend claims.

Examples referenced from ELSF Mathematics Guidance:

- Materials demonstrate activities and ways to help students make meaning of typical mathematical texts such as word problems, graphs, tables, etc.
- Invite EL students to demonstrate **their** reasoning at home using *realia* (e.g., with simple measuring tools found at home).

Student Actions	Teacher Actions
• Represent a problem symbolically. • Explain **their** thinking in a variety of demonstration methods. • Use numbers and quantities flexibly by applying properties of operations and place value. • Examine the reasonableness of answers and calculations.	▽ Ask students to explain **their** thinking regardless of accuracy. Strategies such as sentence starters, vocabulary banks, sentence frames, and anchor charts are especially helpful for ELs. • Highlight flexible use of numbers. • Facilitate discussion through guided questions and representations. • **Accept varied solutions or representations.**

Summary of Practice / Best Practices / Reflection for Belonging and SMP 2
• Make sense of quantities and their relationships. • Decontextualize (represent a situation symbolically and manipulate the symbols) and contextualize (make meaning of the symbols in a problem) quantitative relationships. • Understand the meaning of quantities and be flexible in the use of operations and their properties. • Create a logical representation of the problem, and if possible use visual models to assist in understanding. ▽ Support for EL students in discussions and creating opportunities to ask questions. ▽ Learning activities for ELs in a virtual environment might include the use of digital manipulatives and opportunities for students to draw, save, view, and comment on mathematical representations (e.g., diagrams, numbers lines, graphs, formulas, and equations). ▽ Even if an EL student has not been taught with his/her primary language, there is vocabulary from the home that is an asset to learning mathematical terms. Consider using resources from spanishcognates.org or finding a cognate dictionary for the home language of your students.

▽ This icon is used to identify strategies and actions particularly beneficial to support ELs in mathematics because they integrate language and content.

Standards for Mathematical Practice[2]

SMP 3: Construct viable arguments and critique the reasoning of others.

(SOME CONNECTION WITH BELONGING)

Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases and can recognize and use counterexamples. They justify **their** conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Students learn to determine domains to which an argument applies. Students at all grades can listen to or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.

[2] "Overview of the Standards Chapters"

Sample Actions / Instructional Strategies Related to Belonging and SMP 3

- Use discussion protocols to provide a **safe environment** for students to share their developing thinking and to allow for interactions where **peers value multiple contributions**.

Example referenced from Student Achievement Partners document:

- **Build a safe community** where mathematical discourse supports active listening, promotes **diverse perspectives and insights**, and allows students to consider others' reasoning to advance their own mathematical understanding.
- Utilize a "which one doesn't belong?" activity for groups of students to discuss and analyze correspondences between graphs, tables, and equations that represent a relationship between dependent and independent variables.

Examples referenced from "Kansas Math Standards Flipbook":

- Good math tasks are structured to bring out **multiple** representations, approaches, or error analysis.

Examples referenced from "Supporting ELLs in Mathematics":

- Language in mathematics classrooms includes **multiple**:
  - Representations (objects, pictures, words, symbols, table, graphs).
  - Models (oral, written, receptive, expressive).
- Create **multiple** instructional pathways that provide students with different academic and linguistic backgrounds access to, engagement with, and achievement of standards.
- Facilitate students' production of **different** kinds of reasoning (algebraic, geometric, statistical, etc.) and comparison of reasoning.
- Facilitate students' participation in **different** kinds of participant structures—from informative, collaborative group interactions to formal presentations—in ways that allow them to use their **own** existing linguistic resources and collaborate with others to articulate ideas, interpret information, and present and defend claims.

Examples referenced from "A Framework for Re-envisioning Mathematics Instruction for ELLs":

- Support students in refining **their** use of language to move toward more formal ways of describing, explaining, and justifying their reasoning in solving problems.
- Teachers develop a classroom culture where students feel **safe** to take risks in solving problems and are unafraid to engage with mathematical challenges.

Examples referenced from ELSF Mathematics Guidance:

- Provide visual supports to explain complex ideas. These supports should be presented to EL students and discussed by them before asking them to use one independently.
- Invite EL students to demonstrate **their** reasoning at home using realia (e.g., using simple measuring tools found at home).
- Use a Barrier Game for students to be able to represent their side of the shared problem or story.

Student Actions	Teacher Actions
• Make conjectures to explore **their** ideas. • Justify solutions and approaches. • **Listen to the reasoning of others**, compare arguments, and decide whether the arguments make sense. • Ask clarifying and probing questions.	• Provide opportunities for students to **listen to or read the conclusions and arguments of others**. ▽ **Establish a safe environment** for discussion. • Ask clarifying and probing questions. • Avoid giving too much assistance (e.g., providing answers or procedures).

Summary of Practice / Best Practices / Reflection for Belonging and SMP 3
• Analyze problems and use stated mathematical assumptions, definitions, and established results in constructing arguments. • Justify conclusions with mathematical ideas. ▽ **Listen to the arguments of others** and ask useful questions to determine if an argument makes sense. ▽ Use multilingual resources that can "refresh" EL students with concepts they have already learned but may have forgotten. These include posters about content in Spanish or other primary languages, online flashcards, YouTube videos and other sources. • Ask clarifying questions or suggest ideas to improve/revise the argument. • Compare two arguments and determine correct or flawed logic. ▽ Support for EL students for discussions and opportunities to ask questions.

▽ This icon is used to identify strategies and actions particularly beneficial to support ELs in mathematics because they integrate language and content.

Example of connections to priority mathematics content standards:

Students can develop **Belonging** as they engage in a lesson related to "*Analyze and solve linear equations and pairs of simultaneous linear equations" (8.EE.C.7)*. This can be accomplished by supporting students in SMP 3 utilizing the following actions and strategies:

- Establish a safe environment for discussion.
- Support for EL students for discussions and opportunities to ask questions.
- **Listen to the arguments of others** and ask useful questions to determine if an argument makes sense.

Glossary for Belonging (from SMPs 2 and 3):

Accept varied solutions or representations - *to receive or take (something offered)*

Different: not of the same kind.

Diverse perspectives and insights: *made up of people or things that are different from each other.*

Groups of students: *a number of people who are connected by some shared activity, interest, or quality.*

Multiple: more than one.

Social **norms:** *standards of proper or acceptable behavior (social/cultural norms).*

Own: *used to say that something belongs or relates to a particular person or thing and to no other.*

Recognize family, school, and community: *to accept or be aware that (something) is true or exists.*

The ability to establish and maintain healthy and rewarding **relationships** with diverse individuals and groups: *the way in which two or more people or things are connected.*

Relevant: relating to a subject in an appropriate way.

Build a **safe** community: *providing protection from danger, harm, or loss.*

Their: - *relating to or belonging to certain people, animals, or things.*

All definitions taken from the *Merriam Webster Learner's Dictionary (2020)*.