



Ne'epapa Ka Hana (NKH) 2.0 | Professional Development Program

# **Authentic Social Learning**

An Inclusive Teaching Model to Support Diverse Learners in Hawai'i

## **Module Three: Using the ASLM for Inclusive Mathematics Instruction**

### **Lecture 5:**

#### **The ASLM Guidelines for Creating Inclusive Learning Content and Classroom Environments**

In Module 2 of this training, you learned about the Authentic Social Learning Model (ASLM) for inclusive STEM education. This module will give you guidelines for using the ASLM to create inclusive mathematics classrooms. The intent is to create mathematics classrooms where all of the students are engaged in challenging mathematics and feel empowered to contribute regardless of their mathematics background.

The recommendations in this module are based on Phillips, McNaught, and Kennedy's (2010) LEPO framework of instruction. The LEPO framework conceptualizes learning into three main components: learning environment, learning processes, and learning outcomes. These components work together to improve teaching and learning (see Figure 1). Classroom activities and learning content make up learning processes, and students demonstrate their knowledge and skills through learning outcomes. The LEPO model helps justify the use of the ASLM and validates it against other conceptual frameworks. The ASLM can be used to improve both the educational design of educational innovations and the evaluation and research into the effectiveness of educational innovations.

This module will present the four ASLM guidelines for creating an inclusive mathematics classroom. While learning content is embedded in learning processes in the LEPO framework, for this training we have presented it as a separate section in the guidelines for teaching inclusive

mathematics. In this video, you will learn about the first two guidelines for creating inclusive learning content and classroom environments. This following video will present guidelines three and four for creating inclusive learning processes and outcomes.

## The LEPO Framework

- Learning Environment, Process, Outcomes

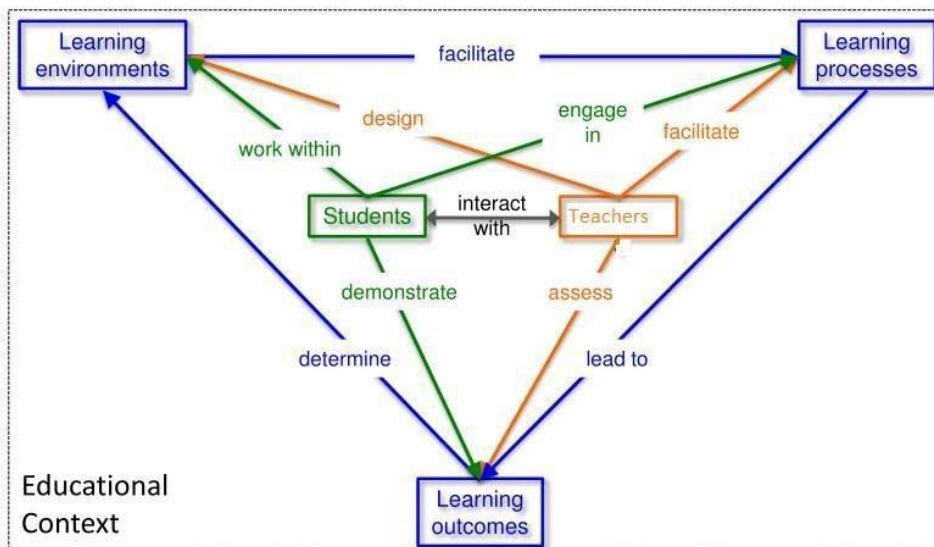


Figure 1: LEPO Framework (Phillips, McNaught, & Kennedy, 2010)

### Guideline 1: Creating Inclusive Learning Content with Authentic Learning

The Authentic Social Learning Model encourages the use of authentic learning to create inclusive mathematics content for students. Authentic learning creates pathways for all students to access mathematics concepts through real-world problems. Authentic learning focuses on the conceptual use of mathematics rather than procedural mathematics, centering on achieving access for all students. By using the ASLM strategies, students of all mathematical abilities can collaborate to solve complex tasks and expand their knowledge.

To implement authentic learning, simply focus your lessons and problems on real-world problems. Authentic learning tasks are as varied as your imagination and the imagination of your

students. Any task you create will be engaging for your students as long as it is something you care about. Your passion for the topic will impassion your students. Your problems can be global or they can be problems that exist in your students' school, neighborhood, or community. To focus on inclusive practices, consider implementing place-based education specifically designed for students in Hawai'i. Focusing authentic learning activities on local issues through place-based learning provides a new avenue for increasing engagement and inclusion.

### *Place-Based Authentic Learning*

Place-based education is a pedagogical approach that incorporates local cultural, historical, socio-political, and natural environments in authentic learning. Place-based education allows your students to interpret mathematics through their previous knowledge, experience, and skills. The essential characteristics of place-based education are that it emerges from the particular attributes of a place, is inherently multidisciplinary and experiential, reflects a philosophy broader than “learn to earn,” and connects place with self and community. In contrast to work-oriented goals of schooling, place-based education prepares people to live and work to sustain the places they inhabit and to participate actively in democracy. The most effective learning occurs when your students connect new information to their prior knowledge and communicate that with others through social learning. Place-based education benefits your students who have previously performed poorly in math because they can connect new concepts to their own experiences. The goal of the ASLM is for students to develop a stronger mastery of skills when they put math ideas into practice and be able to apply concepts across multiple contexts. Woodhouse and Knapp (2000) identified several key characteristics:

- The foundation for the learning activities emerges from the place where the students live. Content for lessons comes from the history, geography, ecology, sociology, culture, politics and other aspects of the place.
- Place-based education is multidisciplinary, meaning learning activities incorporate content from multiple subjects.
- Learning is experiential, meaning that students learn math by solving real-world problems.
- Place-based educators believe students should study and protect the cultural, ecological, and social health of their communities.
- Place-based education draws a connection between place, self, and community. These connections are evident in the curriculum.

## ***Strategies and Examples for Creating Inclusive Learning Content with Place-based Authentic Learning***

In training for authentic learning, the most common concern from teachers is that they do not know where to start when designing their projects. Authentic learning should be based on real-world problems so that your students can develop a solution. If you are struggling to develop creative ideas, ask the students to discuss with you what problems they see in their world. Remember, the more meaningful the problem is to them, the more inclusive and engaging the lessons will be.

In the beginning it might be overwhelming to develop place-based authentic learning tasks, especially if you are new to the area. Just start small and incorporate topics that you have expertise in and are excited about. Start with what you know, then start to explore the current landscape, and when you are more comfortable and more experienced, explore the culture and the history of their place. Give yourself time to get to know the students, the culture, and the language and find opportunities to be exposed to these things. For example, catching the bus in Hawai'i is a great way to learn Hawaiian pronunciations, because the PA system announces the Hawaiian street names as it travels. Look for opportunities for students to share about their culture. For example, if you see a popular restaurant with a lot of local diners, you can ask the students if they've eaten there and what kind of food they like to order. This can help you to quickly learn about the local cuisine. Or students can look in newspapers and find issues that are important to them. This can help you to learn about the kids' concerns and values. Try to get to know other teachers and leaders in the community and incorporate their knowledge into the learning activities. You can use the following suggestions to reference when you are developing an authentic place-based learning lesson.

### ***Inclusive Learning Content Strategy 1: Start with an open-ended, challenging, real-world problem that relates your student's interests and cultures to math instruction.***

Your authentic learning problem should be of interest to your students and one that can be solved in a variety of creative ways. The task should be one that requires sustained inquiry and your students should be able to use their creativity and imagination to solve the problem. Try to focus your problems on local concerns to engage your learners. To help you find ideas for authentic learning tasks, you can recruit your students' help. At the beginning of the year ask your students to rewrite a few of the math problems in their curriculum to focus on their interests or culture. This will help you understand how to better incorporate their perspectives and unique needs into your classroom. For authentic learning tasks, you can allow your students to come up with ideas for local issues or problems that they can solve.

***Example:***

Invasive plants are causing a big problem in Hawai'i because they vigorously spread into areas where native plants inhabit and deplete resources. To create a place-based authentic learning task, you can focus your mathematics content on this problem. Tell your students about a child who came back from the park with scratches on their leg and complaining about thorny weeds in the playground. The parents go to the park and take pictures of the plant. Show pictures of the plant and ask your students to research and identify the plant. They can learn the life cycle of the plant, its natural habitat, and they will also learn how the plant is highly invasive in Hawai'i. Ask your students to research the area of their island that is occupied by this plant, and other invasive species. Your students can then research the size of their island and calculate the percentage of the island that is occupied by invasive species. You can extend this into unit conversions. You can ask your students to report their answers in acres, square yards, and square feet. You can also ask them to write the area as ratios of invasive species to native species. Your students can research the topic and create a public awareness campaign that encourages the use of Hawaiian plants.

***Inclusive Learning Content Strategy 2: Teach math concepts with examples that incorporate local concepts or environments.***

Your students can do a majority of the problem-solving in their groups, but you will still need to teach them the mathematical concepts they need to be successful. When you are teaching math-related content, use local concepts or issues in your math problems to relate it to the learning task.

***Example:***

If you are teaching proportions and probability, you could use an example that incorporates Hawaiian plants. For example, you take a walk through your neighborhood and find that for every three houses with White Hibiscus plants (*Hibiscus arnottianus*) there are five houses with Yellow Hibiscus plants (*Hibiscus brackenridgei*). If there are 750 houses in your town, how many would you expect to have White Hibiscus plants? The curriculum provided with this NKH 2.0 training is a great tool for incorporating local examples in math.

***Inclusive Learning Content Strategy 3: Break the place-based authentic learning tasks down into daily objectives or checkpoints.***

The biggest difficulty teachers face in creating authentic social learning tasks is how to manage them. For the best results, break your project down into a series of problems or objectives that the students can solve throughout the process. Create daily lesson plans with specific goals and objectives for their task for that day. Creating daily tasks and checkpoints will help you and your

students stay focused and engaged. It also allows you to provide feedback through formative assessment

***Example:***

The first few days of any authentic learning task will involve gaining background knowledge through social exploration. During social exploration, you can ask students to turn in at least five resources they used to research the problem with invasive plants with a summary of what they learned from each resource. You have the opportunity to ensure that their resources are credible and their research is focused in the correct direction. Give them specific tasks to complete during their research. For example, one day they can tell you the area of their island covered by invasive species. The next day they could research the effect on the native species. During social ideation, you could ask your students to develop possible solutions to limit invasive species that they will present to their group that day. After that, the next objective could be for the students to take turns evaluating each idea and providing feedback. During social experimentation, you could set an objective for a pros and cons list for each of their possible solutions. Creating objectives gives your students guidelines and helps them manage their time and workload.

***Inclusive Learning Content Strategy 4: Provide opportunities for students to present their ideas in a unique way.***

To increase inclusion, allow your students to present their unique solutions in a way that is motivating and comfortable for them. Allow students to use their imagination. All students should be involved in the presentation during social validation, but students can take different roles based on their comfort and expertise.

***Example:***

For this example, students are developing a public awareness campaign to limit invasive species. You could give the students options for their final presentations. The students could create posters for their public awareness campaign, or they could give a formal presentation. Some students might want to create a website with embedded videos. There are numerous creative options you can use, as long as all students are involved in the presentation and can explain their mathematical reasoning.

**Guideline 2: Creating Inclusive Learning Environments with Social Learning**

That ASLM utilizes social learning strategies to create inclusive classroom environments. As discussed in Module 2, the ASLM incorporates inclusive teaching strategies that remove educational barriers, so students are more willing and able to collaborate. Students collaborate and contribute knowledge through social learning. The ASLM encourages the sharing of personal stories, open-ended reflection, help-seeking, critical problem solving, and equity in

participation. Social learning through the ASLM provides opportunities to incorporate inclusive teaching strategies using whole group social learning, small group interventions, and individual instruction.

Social learning theory recognizes humans as social beings who learn through the observation of others and active participation. They observe behaviors and attitudes and model their behavior based on those observations. Traditional styles of teaching are loosely based on social learning theory. The teacher does a math problem as an example and then the students do a similar math problem. This system of learning may work for some students, but it certainly does not work for all students and does not fit with the needs of 21<sup>st</sup>-century learners. For 21st-century learners, it is important to allow students to work collaboratively with their classmates to develop student-student relationships. When they are working in heterogeneous groups, students learn to explain concepts to their peers in a way that makes more sense to them. The ASLM is a model that expands on the social relationships and connections forged between students as a tool teachers can use to foster an engaging learning environment.

### *Using Social Technologies in Social Learning*

If you have access to technology in your classroom, consider using social technologies to enhance collaboration and social learning. Technology is an essential part of social learning for students in the 21st-century. Students utilize technology to collaborate and gain feedback. As discussed, social learning promotes inclusion in the mathematics classroom. Social technologies allow for students to communicate using tools and methods that are integral in their day-to-day lives, which teachers can expound upon to promote inclusive practices.

Social technology is any technology that promotes communication among students, including social media sites, blogs, wikis, and online videos. Trnova and Trna (2015) found that incorporating social technologies motivated the students to learn more effectively. By using social technologies, students can watch videos, read from online forums, and communicate with others to learn new concepts or to better understand ideas that they may find abstract or difficult. Students can use social technologies to access their social learning networks amongst their own classmates when they are not in the same location. These technological tools can also be used to gain knowledge from students in other classes, schools, or states. In addition to enhancing collaboration among students, social technologies can increase collaboration between you and your students as well. For many students, communicating with the teacher through technology may be more comfortable than participating in face-to-face discussions. As always, check with your administration before you implement social technologies in the classroom; the safety and security of the students is always the top priority.

### *Example of Using Social Technologies to Enhance Social Learning:*

Your students are working together on their public awareness campaign about invasive species in Hawai'i. The students can work in a shared Google document and leave comments or notes, sharing facts and images of the invasive species with one another. They can also provide feedback on shared documents. The students could use Google hangouts to have group discussions when they are not able to work together face-to-face. Students could also create shared folders to store their work, on Google Drive for example, so that everyone has access to the documents. These technologies enhance the collaboration of group members and are especially helpful for students who may not be confident in their social skills or who may not be comfortable sharing out loud.

### *Strategies and Examples for Creating Inclusive Learning Environments with Social Learning*

#### *Inclusive Learning Environment Strategy 1: You can use social learning networks to encourage struggling students to seek help to create a deeper understanding of mathematical concepts.*

Rice (2018) found that students feel more comfortable seeking help from their peers than from the teacher; students were more successful when they accessed their social networks for help. The study found that when some students could not ask their peers for help, they would not seek help at all. Students who work in social networks rely on one another for understanding and learning, so seeking help from peers is a natural part of social networks. As a result, students are not self-conscious about asking for help from other students, as it is viewed as normal social interaction. Seeking help from the teacher, on the other hand, can make some students feel uncomfortable and self-conscious because they feel like they are being singled out. Rice (2018) found that students would seek help from their peers first. If the peers did not have the answer, the group would use available technology resources for help. If they were still unsuccessful the entire group would seek help from the teacher. Students were more comfortable seeking help as a group than as individuals. Incorporating social technologies, if they are available, can create another avenue for help-seeking as students can get help from you digitally.

When your students use social learning to seek help, they develop a deeper understanding of math concepts. Rice (2018) found that students who chose to seek help from the teacher first were usually not seeking out help to understand the concepts. Instead, they were just looking for the teacher to give them the answers and did not care to try to understand the material. Students who used other resources, like peers or technology, were seeking help in the understanding of the concepts and were trying to improve their learning. In many classrooms, students understand that asking the teacher a question may result in the teacher giving more guided questions in response in order to engage the student. Many teachers may also have the opposite experience, resulting in



seeing students come together to copy the answer from one student—without any interest in the reasoning behind the answers. This could be combated by focusing on the collaboration versus granting points solely based on whether the students’ answer is correct or not. Using the ASLM strategies, diverse groups of students work together to apply mathematical concepts to authentic problems. Students use higher-order thinking skills to solve complex problems, creating a deeper understanding of the math concepts.

*Example:*

If you are teaching your students the equivalency of percents, decimals, and fractions, you can ask them to compare the percentage of invasive plants in a given area. In Area 1, 27% of the plants are invasive species. In Area 2,  $\frac{17}{50}$  of the plants are invasive species. In Area 3, the invasive species account for 0.3 of the plants. Ask your students “Which area had the highest percentage of invasive plants?” or “Order the areas from least to greatest percentage of invasive plants?”

First, give your students time to solve the problem individually. Then, ask them to discuss their answers with their classmates. The students will compare their answers and correct their classmates who made errors. The students who were incorrect receive instruction and help from their classmates in a non-threatening environment.

**Inclusive Learning Environment Strategy 2: Encourage your students to select social networks based on the strengths of their classmates.**

Have your students take a personality quiz that identifies their strengths. Discuss the results with each student and help them determine how their strengths relate to group collaboration and what skills they possess that can contribute to group success. When your students select groups based on the strengths of the students in the groups, they will differentiate tasks without knowing that they are doing it. Try to let the differentiation happen naturally if at all possible. Students who struggle in math can contribute to the solution through their unique strengths. By focusing on their strengths, your student’s confidence will improve and they will be more willing to tackle different math concepts and problems even when they usually would be intimidated by such tasks. Using social learning, your students will learn the math concepts being used by working with their teammates.

*Example:*

Each assignment requires students to adopt different roles. For the project on invasive species, you may suggest that your students choose roles for ecologists, botanists, public relations specialists, and project managers. First, ask your students to think about the traits that would help each role. Then, encourage your students to select their networks from the students who are best suited to each role. A simple strategy is to have students use their personality results to choose the role for which they are best suited. Assign a

corner of the room for each role and have students stand in their appropriate corner. Then, tell the students to choose groups with a member from each corner. You may have to intervene if you have too many students in one area and ask some of them to move to another role that they feel they are suited to fulfill. Just remember from Modules 1 and 2, that the formation of the groups should be left up to the students.

***Inclusive Learning Environment Strategy 3: You can use social learning networks to ensure equity in participation and access to complex mathematics for all students.***

Using social learning not only gives students access to help, but helps them feel more comfortable participating in class. In whole group teaching, students are often fearful of participating in class because they are afraid that they will have the wrong answer and be embarrassed. Even when they have the correct answer, you may find that it is difficult to get your students to volunteer to answer a question. When students work in social networks, they are more likely to participate in discussions. Ying and Yang (2017) explained that even students who were not comfortable speaking up in class were comfortable interacting in a discussion forum in a learning network. In teacher-selected groups where students are placed based on academic performance, you may find that the higher-achieving students will just do all of the work, and the lower-achieving students choose not to participate at all due to feelings of incompetence. When students select their social networks, they choose students based on an array of strengths, not just mathematical ability, and tend to form heterogeneous groups. This creates opportunities for all students to participate in complex math problem-solving. For example, you may have a student who struggles with math but is a great artist. In social learning, the students will choose to work with this student because they can provide a different and creative approach to problem solving. The student, approaching mathematics in an unconventional way, feels like a valued and important part of the team and will contribute ideas to the group. Lin, Huang, and Chuang (2015) found that struggling students showed the most improvement when they were comfortable interacting in collaborative groups to get help. Social learning in the ASLM promotes inclusion because the students are comfortable working with and seeking help from their peers which leads to higher student achievement.

***Example:***

To ensure that all students are participating in solving complex mathematical problems, ask each student to write out their problem-solving process on their own paper. Have students work in groups of two to minimize students simply copying off one another. By requiring each student to turn in their own work, you are ensuring that they are actively engaged with the mathematics content. The teacher can help ensure that students are actively participating and not just copying another's work by walking around the room to ask and answer questions and offer help when needed. Another good strategy to help ensure equity in participation is to have the students write down a goal or objective for

each student to accomplish for that day. This way students are assigning tasks and ensuring that everyone participates in the learning process.

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