



STEMD²

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 One: Introduction to Inclusive Teaching in the 21st-Century

Lecture 1:

The Need for Inclusive 21st-Century Classrooms

Introduction to The Ne'epapa Ka Hana 2.0 Professional Development Series

The purpose of the Ne'epapa Ka Hana (NKH) 2.0 professional development training is to introduce you to the Authentic Social Learning Model (ASLM), designed to be an easy-to-follow guide for teaching diverse 21st century learners. This course is intended to provide you with new strategies and skills for teaching iGen or GenZ students in today's classrooms, who's learning styles differ significantly from previous generations.

By the end of this course, you will understand:

- New methods for teaching and learning in 21st century math classrooms
- How you can use the ASLM to design, deliver, and evaluate effective and inclusive STEM instruction for all students, including high-need students
- How to use the ASLM strategies to implement social learning and enhance collaboration in classrooms
- How to lesson plan and transform your classroom into an inclusive 21st-century classroom
- How to plan for and use inclusive assessment in your classroom.

The ASLM focuses on social learning and the effective use of technology resources to help your students develop the 21st century skills they will need for future success. The goal of this

training is to provide you with practical strategies that you can implement to transform your classroom into an inclusive environment that will engage and motivate your diverse students. These strategies are designed to transform your classroom and your teaching, designed to allow for more focus on teaching rather than spending time managing behavior. Keep an open mind throughout the training, imagine how you can implement these strategies to create your ideal classroom, and then use them to recreate a math class with engaged and active learners.

Why We Need to Revisit Teaching in 21st Century Classrooms

As technology advances and continues to change the workforce, it drives the need for changes in education. Educational theories and practices need to change as technology changes the way students learn. Current theories are based on the knowledge that your students think and learn differently from previous generations of learners. In the age of Artificial Intelligence, teachers cannot educate future computer programmers in the same way they educated future factory workers after the Industrial Revolution. Our students will be entering a workforce that is dramatically different from students in the past, and they need a different set of hard and soft skills. Educators need to match their teaching methods with the learning styles of today's students and the needs of the future workforce. Unfortunately, rapid changes in technology have been instituted much quicker in society and in the workforce than they have in K-12 education. The slower evolution of education has created a gap between the skills that employers and post-secondary institutions desire and the skills many K-12 students possess (Scogin, Kruger, Jekkals, & Steinfeldt, 2017). Analysts estimate that 80% of the jobs your students will enter do not even exist yet. Therefore, you have to prepare your students for a job that you cannot even envision or understand yet!

There are a few things analysts know about these unknown future jobs. In their future jobs, your students will be expected, more than before, to collaborate, communicate, and solve problems creatively and effectively. Your students may be expected to communicate and collaborate with coworkers that are in a different country, so they need to be prepared to work in an interconnected world, which entails social and technological networks. To prepare your students now, for an unknown job of the future, your classroom needs to focus on the following 21st century skills:

- Critical thinking
- Creativity
- Collaboration
- Communication
- Problem-solving
- Social skills

- Information literacy
- Technology literacy

21st Century Teaching and Learning - The Roles of Teachers and Students

The roles of the teachers and students in 21st century classrooms are different from traditional lecture-style classrooms. In short, teachers in diverse 21st century classrooms facilitate learning while teachers in traditional classrooms control learning. When you spend large amounts of time giving whole-group instruction, it limits connections between your students and restricts the higher-order thinking processes (Garcia, Elbeltagi, Brown, & Dungay, 2015). Classrooms with teachers who provide all of the information in a lecture format are inadequate for teaching collaboration and communication skills (Ayaz & Sekerci, 2015). In a traditional lecture-based classroom the teacher is the sole source of information, which also means that the teacher is the only resource available to answer questions. In today's classrooms, students need to acquire knowledge from different sources including their peers, online resources, and of course, the teacher. In this setting, your role is to support and facilitate your students' learning with minimal direct instruction.

Implementing 21st century teaching strategies is not a new teaching trend, it is a transformation of your teaching to fit the needs of your diverse students. Garcia et al. (2015) recommend that teachers shift their role from providing information through lectures and focus to creating opportunities for social learning and helping students adapt to learning through collaboration. To gain the skills they need for future success, your students need to be active participants in their education, acquiring new information through collaboration and using that information to create new knowledge. Therefore, effective teachers are active in the classroom to guide learning, rather than being the sole source of information. The ASLM facilitates engagement among students in meaningful content-based conversations that help them first understand 'why' a problem is worth solving and then discover resources, extract knowledge, assess their relevance and reliability, and make connections. This course will help you shift your instruction focus from teacher-centered instruction to student-centered instruction.

An example of a teacher-centered lesson vs a student-centered lesson

Teacher-centered lesson on ratios: The teacher informs the students of the definition of a ratio, how to write them in three different ways, and how to compare different ratios. The teacher then shows examples of each way to write a ratio on the board and goes over how to compare ratios. Students are expected to sit, watch, and listen. Students are then given several problems with no context to demonstrate their understanding of ratio representations and comparisons. Students are then given a score on the number of correct or incorrect problems.

Student-centered lesson on ratios: The teacher knew beforehand that many of their students enjoy surfing. With this information, the teacher begins the lesson by asking the students how many of them enjoy surfing. This class has 28 students and 16 of them enjoy surfing. The teacher also asked the same question to a previous class of 18 students, where 12 of them enjoyed surfing and provided these numbers to the students. The teacher can then ask the students how they would decide which class enjoyed surfing more. This ambiguity allows a discussion to happen in the classroom. Students will have a productive task over how to approach this equation. Some students will compare absolute student counts and some will compare relative counts. This allows a teacher to motivate a lesson on ratios and help students to understand them in a relatable context.

The role of the students in the 21st century classroom is different from traditional student roles because they are participating more actively in their learning. Student-centered classrooms encourage students to learn through collaboration, communication, networking, and self-discovery. A student-centered classroom does not mean that the students get to make all of the instructional decisions about what they learn, which often leads to chaos. However, student-centered simply means that your students are engaged and they are responsible for their own learning. Your role in the 21st century classroom is to guide your students' learning so that they can learn how to learn and why to learn. This allows them to collaborate effectively to solve problems and develop creative solutions. When students collaborate, they practice argumentation and reasoning skills to create shared knowledge and understanding (Kathard, Pillay, Pillay, Nippold, & Joffe, 2015). In a student-centered classroom, the students search for, acquire, and assimilate knowledge in a way that makes sense to them.

Practical Strategies and Examples for Implementing 21st Century Teaching

In developing your 21st century classroom, you are still very much in control of the classroom and the content that students are learning. Embrace the idea that you do not have to be in complete control of everything in the classroom. The students should take ownership of their learning by becoming actively engaged in designing their own learning process and environment. When your students take ownership of their learning and their own behavior, you can spend your time meeting the individual needs of your diverse learners. This NKH 2.0 training will help you recognize the expertise that your students bring to the classroom and create a classroom where students feel empowered to use and share their unique skills and knowledge. To enable your students to take ownership of their learning, you will need to create a student-centered environment that empowers them to do so. The following strategies are based on the attributes and strengths of the iGen generation of students in your classroom to transform your classroom into a diverse 21st century learning environment that empowers your students to be active participants in their own learning.

Teach your students at the conceptual level, not the procedural level.

There is more than one way to approach a problem in math. Math is not a boring “my way or the highway” subject that is only accessible to the elite students who can mechanically replicate the teacher’s procedures and algorithms. Instead, mathematics is rich with creativity and collaboration and truly flourishes when it involves everyone. While some students might be successful at following provided algorithms to solve a problem, many may not be able to explain or understand the mathematical concepts (Abramovich, 2014). Focusing on the underlying mathematical concepts instead, empowers students to choose and design their own approaches to a problem. This can be done by asking your students to explain how they arrived at their solution. As long as their thinking is mathematically sound, allow the students to use that method. Students who understand these concepts will develop their own “shortcuts” that are mathematically valid and make sense to them. The ASLM is designed to help students learn at the conceptual level and many examples will be presented during this NKH 2.0 training.

Example:

Procedural lesson:

The “Butterfly Method” is a shortcut for adding fractions. It allows you to come to numerical solutions without finding common denominators. Students who are taught to use this method may be able to quickly solve $\frac{1}{4} + \frac{1}{3}$, but do not have an opportunity to understand the purpose of common denominators. In real-life, we are not often faced with a situation where we need to arbitrarily determine that $\frac{1}{4} + \frac{1}{3} = \frac{7}{12}$.

Conceptual lesson:

Learning the purpose of a denominator and why fractions are difficult to compare when their denominators are different will allow students to choose a strategy to approach fraction problems. They may very well choose the “Butterfly Method” but they may also draw diagrams, use equivalent fractions, or approach the problem in a different way. They will also be able to answer real-world questions such as the following. “There is one-fourth of a pizza left in one box and one-third of a pizza in another box. Seven students decide to share the pizza evenly. One student suggests that the pizza should be sliced into $\frac{1}{12}$ pieces. Why should the students do this?”

Teach your students through active participation.

Be cognizant of the amount of time you spend in front of the classroom talking. In the ASLM, students learn best through active participation and engagement, so do your best

to limit your lecture time. Do you remember that last time you got a new phone? What did it take to learn all of its features? Reading the manual and watching a presentation? Or actively playing with your phone? Your students would do what you did; start using the phone to figure it out. The ASLM advocates that being actively engaged with the lessons and math concepts is a highly effective way to learn. Your students need to play with mathematics and experiment with them to learn. They learn more from their mistakes than your instruction.

When young children are learning about numbers, they are given a lot of opportunities to experiment with numbers and quantities. Parents give their children small snacks and teach them to count the number of snacks. They may count their friends at the park or the number of dogs they see. Children develop a sense of numbers through experimentation and play. For some reason, we take that away when they get older. But students still need time to make sense of numbers through active participation.

Example:

Instead of doing a lecture on how to calculate the probability of two independent events and assigning a set of practice problems, this lesson can be expanded to be more hands-on. Students can start by rolling two dice and recording the resulting sums. Students can then share their results with other groups and hypothesize the theoretical probability of rolling a 12. Students can then be challenged to model the dice rolls to justify their predictions. The teacher can then help the students to discover the mathematical rules for independent events.

Give your students time to work with the concepts and reason through math. The ASLM strategies that will be introduced in the next module of this training will help you do this.

Maintain an environment of constant cognitive engagement.

Students today can multitask much more effectively than the past generations. Your students live in a world of high cognitive engagement that would have been considered overwhelming in the past. In many of today's classrooms, the traditional math activities of repetitively performing a simple task can actually restrict a student's ability to succeed in math and above that diminish their creativity. Many students may struggle to stay attentive during these activities, students might finish early and struggle to behave while waiting for others, or students might not finish at all and burn out from the tediousness. These students could also end up leaving the classroom with false stereotypes of mathematics— such as that math is about robotic calculations, void of creativity, and only accessible by a select few who were “born with the ability to do it.” Many of these

pitfalls can be avoided in an environment that provides students with constant cognitive engagement through well-designed tasks.

Do you remember when your teacher used to pass out a worksheet? You were expected to complete the worksheet and then sit idly and wait for others to finish. There are still classrooms like that today, but today's students do not do well with idle time. These students need to be busy and challenged. Idle time means that the students are not cognitively involved or learning. Instead, pose a challenging problem to your students and ask them to solve the problem with their group. After they solve it, ask them to explain and justify their answer. If a group finishes early, challenge them to find other ways to solve the problem, or help other groups by documenting and sharing their problem-solving solution. If you present the challenge, the students will tackle it.

Example:

Occasional Cognitive Engagement

The teacher gives out a worksheet to the students with a list of coordinate pairs that need to be transformed using an algebraic expression from the worksheet. The students plug in each coordinate pair into the algebraic expression and report the results. Some students finish very early and some do not finish at all.

Constant Cognitive Engagement

In a math classroom, students are provided a worksheet with multiple drawings of popular cartoon characters that students can choose from. Each drawing has a coordinate grid overlaid on top. The students will use an algebraic expression from the worksheet to transform their drawings. They are also challenged to give as much detail as possible. Students that work quickly will be able to use the entire class time to transform the coordinates to get more features and produce a drawing with many details. The teacher can help these students identify minor details that they may have missed. Students who need more time to work through the problem will be able to approach the activity at a pace that is appropriate to them. The teacher can help these students to identify the major details of the drawing that they have missed. If the teacher feels that everyone has at least completed the major details, some classroom time may be allotted to allow the students to share their art with one another.

Empower your students to have a voice in the classroom and sympathize with them. Empathy is the language of respect!

It would be nice if teachers could let their students decide what they would like to learn and how they would like to learn it. Teachers are provided with standards and guidelines that determine what the students have to learn, but you have the freedom to decide how your students learn it. Choose to empower your students by incorporating their ideas and cultures into the classroom where you can. Host weekly or bi-weekly meetings where your students have the opportunity to ask questions and share ideas. Set guidelines for the meetings ahead of time to ensure that students are focused on constructive feedback and not complaints. Let the students know that their opinion is valued, and you want to incorporate their ideas. Let them know while some things like standardized tests and curriculum standards cannot be altered, their long-term well-being is more important to you than their academic performance. This establishes trust and in turn, motivates students to perform better academically.

The ASLM strategies presented in the next module are designed to empower your students in the classroom.

Example:

During a math class, the teacher comes across an activity that asks students to create a stem and leaf diagram with a set of numbers that represent racing times from world-class skiers. In this class, most students are on the canoe paddling team, therefore, the teacher decides to modify the activity to be about paddling instead of skiers, in order to create a contextual problem the students can relate to. The teacher creates a student discussion about the most prestigious canoe race and asks the students about their favorite canoe teams. The teacher even manages to attend one of their practice sessions. Students are then tasked to find the racing times of the teams that they like and create a stem and leaf diagram by those numbers.

Possible Pitfalls to Avoid in Implementing 21st-Century Teaching Strategies

Don't think you are relinquishing complete control of the classroom.

A student-centered classroom is not a student-directed classroom. Implementing 21st century teaching makes your job more enjoyable, and you are still going to be teaching. You are still the authority in the room. You are still in charge of planning the lessons for your students. You are still responsible for monitoring student behavior. You will be monitoring student learning, technology usage, and social learning. Your control over the classroom does not go away, it only shifts focus to facilitate learning and co-plan the learning process.

Don't assume that just because students are working in a group they are collaborating.

Students do not know how to collaborate effectively. Often, one student does all of the work and the other students sit back and do very little. This NKH 2.0 training will show you how to help your students learn to be self-directed learners who collaborate effectively. During the effective collaboration, all of the students are contributing, learning, and creating new knowledge.

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