Session 12: Creating an Inclusive Learning Environment

Overview

This session delves into the realm of diversity in learning environments and how to address the needs of all learners. The focus is to build knowledge about the relationship between language, culture, and science in order to create more inclusive science education environments. Issues related to diversity, equity, and inclusion are in the forefront of the national consciousness and have become an integral part of daily classroom reality. This session gets participants thinking about issues of inclusion by considering what kinds of differences exist between people and gaining a sense of other perspectives. An activity is presented entirely in Spanish to illustrate techniques designed to increase all learners' comprehension of high–level science concepts. Participants then discuss choices an educator might make about ways to interact with a learner based on the educator's assumptions about the learners' cultural capital (a person's entire set of skills, knowledge, ideas, and language) and consider the impact of educator assumptions, expectations and behaviors on learners' comfort level in a classroom. Participants apply the experiences in the session as they modify a lesson to be more inclusive of diverse learners.

Background Information for the Presenter

While people of color and English language learners are generally underrepresented in science and science education-related careers in the United States, it is well known that ocean sciences is among the least diverse of all science fields. Not only do people from "underrepresented" groups have a right to enjoy and learn about the ocean, it will require the attention and intellect of the best minds from every group to ensure a sustainable future for the ocean, ocean resources, and the planet. Issues related to diversity, equity, and inclusion are at the forefront of the national consciousness and have become an integral part of daily classroom reality.

The social context of the African-American civil rights movement, other affirmations of racial and cultural identity among Native American, Latino, and Asian communities, and a general recognition of the increasing cultural, ethnic, and linguistic diversity of the United States have had a major impact on our educational system. While many educators have dedicated themselves to shaping educational programs that are responsive to these realities, achievement gaps and enormous disparities in educational quality between more and less resourced communities remain of deep concern. The resurgence of movements and organizations concerned with the role and position of women in society has also had a profound impact. Less widely recognized, but equally important in

terms of the impacts it has had on education, is the Community Imperative movement of the Americans with Disabilities Act (ADA), which asserts the rights of people with physical and developmental disabilities to live, work, and learn in a community rather than in institutional settings. Legislation requiring access to public spaces for people with disabilities has changed not only the programming in museums, aquariums, and science centers, it has also changed the design of the buildings and exhibits themselves.

Science and mathematics educators have become increasingly aware of the groups who have not been well represented in scientific and technical careers, and have recognized the need to take major measures to develop more inclusive and accessible learning environments. Such "historically underrepresented" groups include those that have suffered discrimination, poverty, or lack of educational opportunity, including, in many cases, girls and young women. Social prejudices and institutional barriers in traditional educational pathways have placed obstacles in the paths of many girls and young women when it comes to science, mathematics, and related fields.

Many studies have confirmed the negative impact on learning and career trajectory of racial, linguistic, disability, gender, and socio-economic discrimination in the U.S. education systems and in society at large. There are also many studies that document the disproportionate growth of the population of underrepresented youth in the U.S., along with their disproportionate lack of participation in museums, aquariums, and science centers. Improving the inclusiveness of free choice learning institutions is thus as much a matter of survival to the institutions themselves as it is a matter of social justice. For more on this topic, see *Confronting Demographic Denial: Retaining Relevance in the New Millennium* by Eric Jolly (2001).

On the positive side, the leading national standards and articulated goals of math and science educators in the United States incorporate a truly democratic vision—that of reaching **all** learners. "Inclusion" refers to efforts to develop ways to help ensure that all learners—regardless of race, language, culture, nationality, gender, and many other real differences—have the opportunity to experience high-quality science and mathematics instruction.

In working toward this goal of high-quality science education for all, science educators must understand as much as possible about the learner's background, interests, and learning styles. In this way, the learner's unique combination of cultural skills, knowledge, and understandings can be accessed and drawn upon in service of science learning. Learning theory teaches us that educators must begin by accessing learners' prior knowledge, so that new ideas and concepts can be integrated and old ideas can be expanded, re-arranged, deepened, or sometimes, discarded.

Science is a discipline with historical, sociological, political, and cultural constructs. And learning cannot be separated from cultural practices and perspectives. Influential environmental factors and personal interactions among learners help shape their identity and influence thinking, values, and attitudes. Each learner has nuances of expression, as well as cultural and linguistic differences. Underlying social relations and cultural practices are rituals, common sense knowledge, language expressions, mathematical understandings, and overt cultural behaviors that may or may not allow the learner to gain access when engaging in science learning. As more science educators come to understand that learners develop ways to negotiate culture, social, and language boundaries between their own culture, the culture of science, and the culture of learners, the more we enhance the success of our efforts.

Cultural Capital and the Deficit-Thinking Paradigm
Research defines **cultural capital** as a person's entire set of skills, knowledge, ideas, and language. In essence, it is the cultural "fund" that the learner draws upon to support his or her interactions with others in all aspects of his or her life, from family life, to peer interactions, to formal and informal educational settings. When educators perceive the values, knowledge, abilities, and life experiences of a learner as strengths and resources, they see the learner as having a "fund of knowledge." The concept of a learner's fund of knowledge is an asset-oriented approach that considers one's upbringing, home, and experiences as relevant and of value.

The **"deficit-thinking paradigm"** is defined as the belief that diverse learners have internal deficiencies (e.g., cognitive and/or personality traits such as motivation) or social deficiencies (e.g., familial dysfunction). This mode of thinking places the onus on the learner, their home, and their life experiences as a causal notion for failure. What the learner brings with him/her is regarded as deficient, not useful, or counterproductive to learning. An educator approaches the learner not through the belief that the learner can be successful, but in an attempt to save them from themselves, their parents, and the environment in which they live.

One example of deficit-model thinking is the research on perceived disengagement and silence of Native-American learners observed in classroom settings (Phillips 1986). Observations outside of the classroom indicated that learners were not silent. In the learners' homes, children were working together cooperatively in groups, not competitively, while classrooms were organized in an individualistic and competitive manner. Thus, for a Native-American learner to stand out in the classroom, to act on his or her own, independent of the group, was a violation of the norms cultivated in their home.

Additional Research on Access and Equity
Research highlights that middle school females of all ethnic and racial groups lack positive attitudes toward science, participate in fewer science-related extracurricular activities, and aspire less to science careers than their male counterparts. Often, males are given negative attention, which monopolizes teacher attention and even determines how the room is arranged. This causes gender bias to exist, manifested as lower quantity and quality of teacher engagement with females, different texts and material for males than females, separate curriculum, and teacher views of females having lesser status (Sadker & Sadker 2002). Schools create second-rate conditions for female students, as texts shape not only students' knowledge but also their ideas, beliefs, and behaviors, and female students become increasingly silent to the point of doubting the value of what they have to say (Brown 2002). Females "feel unrecognized in their classrooms," which causes them to either resist the norms of femininity valued in school and society or embody "femininity in ways that ensure their acceptability and yet blend them into the amorphous backdrop of 'nice girls,' existing just out of their teachers' conscious awareness" (Brown 2002, p. 215).

Learners of different socioeconomic statuses (SES) are also exposed to qualitatively different types of educational knowledge. For example, studies have found that higher-SES schools tend to have higher percentages of teachers with more teaching experience (Haycock 1998; Lynch 2000). Aside from teacher quality, the types of courses (such as advanced placement or honors courses) offered to lower-SES learners are lacking. Higher-SES schools have been found to provide more access to educational opportunities, including advanced courses and more involvement with teachers and guidance counselors (Spade et al. 1997).

For English language learners (ELLs), language plays an important role in science achievement as science requires vernacular skills of high-level academic English literacy, often times leaving ELL students at a disadvantage when learning and understanding advanced scientific concepts or having equitable access to college track science courses (Gandara 2006; Garcia & Baquedano-Lopez 2007). English Language Learners (ELLs) are also subject to significantly shortened academic schedules, segregation, over-placement in Special Education, and lack of teaching by qualified teachers (Gandara et al. 2003; Olsen 1997).

It is part of the work as educators to see and welcome learners' unique funds of knowledge and incorporate their perspectives into science learning. To do this, we must think about the conditions that are created in classrooms, how these conditions affect all learners, and how to teach science through a more inclusive lens. If not, we risk alienating younger generations whose insight, knowledge, and creativity will be vital to understanding and protecting our ocean and planet.

Of course, these are all complex, controversial, and fascinating topics and issues, and one of the main ideas of this session is not to draw any oversimplified

conclusions, but instead to open the door for ongoing participant awareness of and interest in the idea of creating inclusive learning experiences.

Session Objectives

— Explore a broad definition of diversity to mean all of the differences that exist between people, including ethnicity/race, gender, learning styles/work styles, language, visible and less visible disabilities, sexual orientation, personal values, socioeconomic conditions, and religious customs/religious beliefs.
— Consider the impact of educator assumptions, expectations, and behaviors on learners' comfort level in a classroom.
— Introduce participants to different models of thinking about learners from non-dominant cultures, as having a fund of knowledge vs. having a deficit.
— Participants will modify a lesson to be more inclusive of diverse learners and take away ideas of ways to modify lessons for diverse learners.

Session Activities at a Glance

What Are Differences? (25 minutes)
This activity gets participants thinking about issues of inclusion by considering what kinds of differences exist between people and gaining a sense of other perspectives. Participants are asked to adhere to guidelines for safe discussion of potentially sensitive topics. They talk in pairs about times when they've felt excluded or when a stereotype was used for or against them. Together, the whole group then brainstorms a list of types of differences between people, including: Ethnicity/Race; Culture; Gender; Learning Styles/Work Styles; Language; Visible and Less Visible Disabilities; Sexual Orientation; Personal Values; Socioeconomic Conditions; and Customs/Religious Beliefs.

Apple and Ocean + Debrief (80 minutes)
This lesson is presented in its entirety in Spanish using **SDAIE*** strategies. Participants use an apple and a pie chart to represent the planet. They slice the apple and draw the chart into sections illustrating various critical resources available from the land and ocean, and realize what a small fraction of the planet they represent.

> ***SDAIE** *stands for Specially Designed Academic Instruction in English. It is also sometimes known as sheltered instruction. SDAIE refers to curriculum and courses in content areas (science, mathematics, social studies, etc.) designed to be delivered in English to learners whose native language is not English but who have reached intermediate proficiency in English. These learners will find SDAIE activities comprehensible and academically challenging at or above their grade level. They will also find that the activities help build their English language skills.*

"But I Can't Speak Spanish!"
Spanish is the suggested language to be used while modeling this lesson, but any language in which you or a guest presenter are fluent is suitable. The key element here is that while perhaps a few course participants may be fluent enough to follow the lesson, the majority of participants will be experiencing the challenge of being a language minority in a learning environment. We have successfully found assistance for the teaching of this lesson from Spanish speaking colleagues. The lesson does not require any special science content knowledge to successfully present. The lesson outline provides instruction on how and when to incorporate very simple SDAIE strategies for building inclusion and understanding. *While perhaps a bit more work is needed to prepare for this lesson, we strongly recommend you try it. It has been our experience that the lesson has a great impact on-learners and is transformative in how they regard their own teaching.*

Participants will then work together to brainstorm a class list of strategies they noticed the educator using, to help learners feel more included and able to understand the lesson in Spanish. They will also receive a list of suggested strategies for use with English Language Learners.

Cultural Differences, Cultural Capital, and Deficit-Model Thinking (25 minutes)
After the facilitator introduces ideas about the ways in which cultural values can be perceived differently, participants read a brief description of two modes of thinking about learners from non-dominant cultures—the view that all learners possess "funds of knowledge" or cultural capital and the view that learners from non-dominant cultures have a deficit that has to be supplemented. Participants then discuss choices an educator might make about ways to interact with a learner based on the educator's assumptions about the learner's cultural capital.

Application (30 minutes)

Participants work with others at their tables to modify a lesson for diverse audiences. The participants share their modifications with the whole group. Partners then discuss their own designed lesson and how they might modify it for diverse audiences.

Wrap Up (5 minutes)

Homework (5 minutes) *(Note—this homework is assigned as part of the UC Berkeley course; other institutions may decide to use these assignments or develop different assignments.)*

Reading:
— Baker, Beth. Recruiting Minorities to the Biological Sciences. *Bioscience,* 50:3 March 2000.

Activity Development:
- Participants modify their own designed lesson to be more inclusive of diverse learners.

Time Frame

Total Workshop: 2 hours 50 minutes (170 minutes)
What Are Differences? (25 minutes)
Apple and Ocean + Debrief (80 minutes)
Cultural Difference, Cultural Capital, and Deficit Model Thinking (25 minutes)
Application—Modify a Lesson (30 minutes)
Wrap-Up and Homework (10 minutes)

Materials Needed

For the group
- ❑ PowerPoint presentation for Session 12: Creating an Inclusive Learning Environment
- ❑ PowerPoint presentation: Apple and Ocean—Spanish
- ❑ Digital/data projector
- ❑ Chart paper
- ❑ Markers
- ❑ Masking tape

For What Are Differences

For the group
- ❑ PowerPoint slide: "All students, regardless of age, sex, cultural or ethnic background, disabilities, aspirations, or interest and motivation in science, should have the opportunity to attain high levels of scientific literacy." — *National Science Education Standards*
- ❑ PowerPoint slide, *Discussion Guidelines*
- ❑ Chart paper and markers to make the list of types of differences among people

For Apple and Ocean
- ❑ Apple and Ocean activity (see English and Spanish versions attached)
- ❑ MANZANA Y OCEANO (outline of Spanish presentation in Spanish attached)

For SDAIE Component:
Sentence strips (see Preparation of Materials):
- — La mitad 1/2
- — Un tercio 1/3
- — Un cuarto 1/4
- — Un octavo 1/8

  — Un diesiseisavo 1/16
  — Un treintaidosavo 1/32
  — Hidráulica
  — Zona de Ascensión
  — Zona Costera Productiva
  — Agua Potable
  — Agua Tierra
  — El Océano
  — Los Recursos Naturales

For Cultural Differences, Cultural Capital, and Deficit-Model Thinking

For the whole group:
- PowerPoint slide "Klingon Values Chart"
- PowerPoint slide "Core Values Chart"

For each participant:
- One copy of "Cultural Capital and the Deficit-Thinking Paradigm" handout

For Application

For each participant:
- One copy of handout "Strategies for working with English language learners"
- One copy of handout "Inclusive Instructional Techniques for Learners with Disabilities"

For each table group:
- 1–2 copies of the MARE *Crayfish Investigation* lesson

Preparation of Materials

For Apple and Ocean

1. Write the following on separate sentence strips large enough for the class to read anywhere in the classroom:
  — La mitad 1/2
  — Un tercio 1/3
  — Un cuarto 1/4
  — Un octavo 1/8
  — Un diesiseisavo 1/16
  — Un treintaidosavo 1/32
  — Hidráulica
  — Zona de Ascensión
  — Zona Costera Productiva
  — Agua Potable

— Agua Tierra
— El Océano
— Los Recursos Naturales

2. Place long strips of masking tape on the white board, sticky side out and with the ends looped over to stick to the board. Reinforce each end with a short piece of tape to ensure the long strip stays adhered to the board. These sticky strips will make it easy to place the sentence strips up as you need them during the Apple and Ocean portion of the session.

3. If you are not fluent in a language other than English, recruit a colleague or even a student to do the Apple and Ocean portion of this session. Read over the Apple and Ocean activity in English, the summary notes in Spanish and the Spanish PowerPoint to become familiar with the activity. If you will be doing the activity in a language other than Spanish, prepare equivalent sentence strips and PowerPoint in your language of choice.

Handouts Needed
1. Duplicate one copy of each of the following handouts for each participant:
   • "Strategies for working with English language learners"
   • "Inclusive Instructional Techniques for Students with Disabilities"
   • "Cultural Capital and the Deficit-Thinking Paradigm"

2. Duplicate one or two copies of the MARE *Crayfish Investigations* lesson from *MARE Teacher's Guide to Wetlands* for each table group. You may decide that you would like to use a different activity for this application—many lessons could benefit from this exercise to make them more inclusive of all learners.

Instructor's Guide–Session Details

What Are Differences?

1. Share the following information to introduce session. Share with participants that during the 50s and 60s, as the Soviet spacecraft Sputnik soared into the heavens, many people thought our country was falling behind in scientific and technical expertise. Initial science reform efforts at that time focused on rigorous high school science courses targeting those students who might go on and excel in science careers. Over time, fewer and fewer students enrolled in science courses, and those who did were often white males.

In contrast, the goal that emerged by the end of the 20th century was that all citizens should have an opportunity to become scientifically literate. Show the overhead transparency of the following quote:

> *"All students, regardless of age, sex, cultural or ethnic background, disabilities, aspirations, or interest and motivation in science, should have the opportunity to attain high levels of scientific literacy."*
>
> — *National Science Education Standards*

This session will focus on how educators can create a learning environment that is inclusive of all learners.

2. Do Quick Write. Ask participants to briefly respond in writing to the quick write:

> Write about one thing you found interesting or surprising in the homework reading about diversity and equity in aquatic sciences.

3. Display *Discussion Guidelines* slide. Display the PowerPoint slide entitled, *Discussion Guidelines*, and tell participants that since some sensitive issues may come up during discussions in this session, they are asked to adhere to these guidelines:

- Be open and honest
- Adhere to confidentiality and discretion
- Be an active participant
- See things in a new light—try to see from perspectives other than your own

4. **Participants discuss.** Have participants form a discussion group of two or three people sitting near them. Tell the groups to discuss times when they've felt excluded, or a time they've felt a stereotype was used for or against them.

5. Whole group share out experiences. After a few minutes of discussion, regain the attention of the entire group. Ask if anyone would like to volunteer to share something they discussed with their small group.

6. Whole group brainstorm about differences. Have participants brainstorm a list of types of differences between people. Record their ideas on chart paper and suggest some of the following if they do not come up in the sharing out of ideas:
- Ethnicity/race
- Culture
- Gender
- Learning styles/work styles
- Language
- Visible and invisible disabilities
- Sexual orientation
- Personal values
- Socioeconomic conditions
- Customs/religious beliefs
- Newly-arrived immigrants
- Political affiliation
- Differences in appearance

7. Lead a discussion about the effect on learning. Ask students how they think these differences might affect the learning experiences of students in classrooms. [Possible ideas: Students may feel excluded; have difficulty communicating/understanding; might feel out of place/not welcome when they do not see educators who look like them; might feel frustrated or excluded because they have difficulty participating in activities; etc.]

Apple and Ocean

1. Introduce activity. Tell participants they will now experience an activity that models one set of strategies for creating an inclusive learning environment. We want participants to experience the whole activity for the purpose of developing a deeper understanding of what it is like to not be a part of the majority language—and how an educator can help a learner in that situation.

2. Engage participants in Apple and Ocean Activity. *(*See attached write-up for this activity.)

3. Debrief Apple and Ocean Activity. Lead a whole group discussion about the three questions (below). As you lead the discussion, remind participants to share ideas and to respond to what others have said. Record responses, to refer to later in the session.
- What were you feeling during that lesson?

— What types of strategies did the instructor use to make you feel included? [*He/she let us speak in English at our tables; allowed us to have one person speak to the whole class for our group after we all participated together; etc.*]

— What strategies and structures helped you understand the lesson? [*The educator used cognates—words that are spelled the same in both languages, but may sound different; the educator used important vocabulary as it came up in context by repeating words, showing the word in writing, and demonstrating the meaning; the educator provided time for us to speak to each other so we could clarify ideas at our table groups—this was really helpful when at least one person at the table spoke Spanish; etc.*]

4. Distribute "Strategies for Working with English Language Learners" handout. Distribute the "Strategies for Working with English Language Learners" handout and give participants a few minutes to review it and ask any questions.

Examining Cultural Values

1. Introduce cultural values. Tell students that identifying cultural values, examining how they relate to behaviors, and learning how these behaviors may be perceived by others can help dispel cultural misunderstandings and lead to a more inclusive learning environment.

On the one hand, gaining an understanding of a group can help improve our understanding of individuals in it. On the other hand, it is crucial to **remember not to stereotype** all individuals within a group by automatically ascribing group traits to them.

2. Display the "Culture Defined" slide. Display the "Culture Defined" slide and read it aloud.
> *Culture is defined in Webster's Third New International Dictionary as "the body of customary beliefs, social forms, and material traits constituting a distinct complex of tradition of a racial, religious or social group" and as "a complex of typical behavior or standardized social characteristics peculiar to a specific group, occupation or profession, sex, age grade, or social class."*

3. Small group discussion. Have participants discuss the following prompt with their table group:
> "Why do problems sometimes arise when people from different cultures interact?"

4. Whole group share out. Encourage table groups to share what they discussed. Remember to use the discussion map and encourage alternative viewpoints and the use of examples and evidence where possible. If participants don't bring up the following points, you might want to add:

- Misunderstandings about language, body language, other differences
- Conflicting values
- Conflicting behaviors
- Grouping with those who are similar/familiar, and excluding those who are different/unfamiliar.

5. Share example of perceptions of cultural characteristics. Point out that cultural characteristics can be manifested and perceived in both negative and positive ways. For example, during the 2008 presidential campaign, Hilary Clinton was often portrayed by the media as being cold and calculating. Many people critiqued this portrayal by pointing out that if she were a man, these same characteristics might be considered rational and efficient.

6. Project the PowerPoint slide of the Klingon Values Chart. Display the Klingon Values Chart and explain that the core cultural values of the fictitious culture called the Klingons are in the center of the diagram. The positive perceptions of characteristics that grow from the core values are in the next circle out. The items in the third circle are negative ways in which those same characteristics may be perceived by others.

Emphasize that of course no culture or individual can be accurately characterized through a simplistic diagram. These charts may provide insights into possible sources of cultural (or gender) conflicts.

7. Display the Core Values Chart. Display the Core Values Chart and stress that all cultures and individuals hold many of the values that are listed, and these shared values help produce harmony between cultures. Still, the ways values are prioritized, and the different characteristics and behaviors that flow from them can cause misunderstanding and conflict.

8. Display the Characteristics—positive and negative perceptions chart. Display the Characteristics chart and reiterate that these cultural, including gender, characteristics can be manifested and perceived in both negative and positive ways as was mentioned regarding Hilary Clinton. Suggest that the participants might want to think about three or more core values they hold important and some of the ways that they might be perceived by others as positive or negative characteristics. Distribute the Core Values and Characteristics handout to each participant.

Optional:
You might think about providing the participants with a blank Values Chart and have them complete it for homework. Explain that they should list three cultural values in the center of the circle, positive ways those characteristics could be perceived in the next ring and possible ways those same characteristics could be perceived by others in a negative

way in the outermost ring. Tell them that although the activity is much richer when more than one person shares and compares charts with each other, they do not need to share their charts with anyone if they do not feel comfortable doing so.

Funds of Knowledge and Deficit Model Approaches

1. Introduce Cultural Capital and Deficit-Thinking Paradigm" handout. Tell participants that another issue which frequently arises when educators and learners come from different cultures is a perception that the learners have short-comings, which need to be supplemented by the educator. Ask participants to take the next five minutes to individually read the handout "Cultural Capital and the Deficit-Thinking Paradigm."

2. Do Think Pair Share. After most people have finished the reading, or after about five minutes, regain their attention, and have them do a Think Pair Share—participants think quietly for a minute or two, then discuss their ideas with their table groups, then discuss with the whole class the following question:

> *"How would an educator's choices be different about how to interact with a learner depending on whether the educator viewed the learner as having a 'fund of knowledge' or a 'deficit?'"*

> **Note to Facilitator:** Remember to encourage participants to:
> - Share multiple viewpoints
> - Agree and disagree
> - Provide evidence and clarifications for their viewpoints and dis/agreements
> - Respond to one another's comments

[Possible answers: the educator may not challenge the learner if they had a deficit view; the learner may feel as if the educator is being condescending if they have a "deficit view;" the educator may have higher expectations of the learners if they have a "fund of knowledge" view; the educator may make wrong assumptions about the learners; the educator may withhold opportunities from learners if (s)he doesn't think the learners are capable; etc.]

Application

1. Introduce disabilities. Share with participants that other differences that can exclude learners from participating in classroom activities are physical and developmental disabilities. Distribute the handout "Inclusive Instructional Techniques for Learners with Disabilities" and give participants a few minutes to scan through the techniques.

2. Introduce Lesson to modify. Distribute one or two copies of the MARE Crayfish Investigations lesson to table groups. Explain that their task is to work

with their table group to modify the lesson for a different one of the diverse learners below:
- — A learner who is hearing impaired
- — A learner who has a developmental disability
- — A learner who speaks a language that you don't speak
- — A learner who has limited English proficiency
- — A learner who is very quiet and is not touching any activity materials

Depending on the number of student groups, you can either assign multiple groups the same task, or assign groups to modify the lesson for a learner in a wheelchair, a learner who has limited vision, etc.

3. Group share out of modifications. Depending on your time constraints, call on a few volunteers to share their ideas for ways in which to modify the MARE Crayfish lesson to be more inclusive of diverse learners.

4. Participants discuss modifications of their own activity. Give participants five minutes to discuss with their partner ways in which they might modify their own designed lesson for diverse learners. Tell them that they will write up their ideas for homework about ways in which they could make their lesson more inclusive.

Wrap-Up

1. Participants do a Quick Write response for the session. Tell each participant to get out a piece of paper and write their thoughts about how the session has affected their ideas. Display the following slide:

Summarize your thinking about creating an inclusive learning environment and the role educators can play.
If you can, please include:
- • How have your ideas changed?
- • What do you think made your ideas change?
- • How might you use this in your science teaching?

Homework

Reading
Assign the reading from the course reader.

Activity Modification
Students will modify their designed lesson to be more inclusive of diverse learners.

Cultural Capital and the Deficit-Thinking Paradigm

Cultural Capital. Research defines cultural capital as a person's entire set of skills, knowledge, ideas, and language. In essence, it is the cultural "fund" that the learner draws upon to support one's interactions with others in all aspects of the learner's life, from family life, to peer interactions, to formal and informal educational settings. When educators perceive the values, knowledge, abilities, and life experiences of a learner as strengths and resources, they see the learner as having a "fund of knowledge." The concept of a learner's fund of knowledge is an asset-oriented approach that considers one's upbringing, home, and experiences as relevant and of value.

Carol Lee (1993, 1995, 2001) has used this approach to design learning environments that leverage knowledge associated with everyday experiences to support subject matter learning (in her case, literacy practices). Lee's approach, termed cultural modeling, works on the assumption that students who are speakers of African American vernacular English (AAVE) already tacitly engage in complex reasoning and interpretation of literacy concepts, such as tropes and genres. She engages students in metacognitive conversations in which students make explicit the evidence and reasoning they are using in their discussions. The conversations might focus, for example, on how students know that rap lyrics are not intended to be taken literally, and the strategies they use to interpret and reconstruct the intended meaning. These conversations reflect AAVE norms, such as multiparty talk and signifying.[1]

Deficit-Thinking Paradigm. The "deficit-thinking paradigm" is defined as the belief that diverse learners have internal deficiencies (e.g., cognitive and/or personality traits such as motivation) or social deficiencies (e.g., familial dysfunction). This mode of thinking places the onus on the learner, their home, and their life experiences as a causal notion for failure. What the learner brings with him/her is regarded as deficient, not useful, or counterproductive to learning. An educator approaches the learner not through the belief that the learner can be successful, but in an attempt to save them from themselves, their parents, and the environment in which they live.

One example of deficit-model thinking is the research on perceived disengagement and silence of Native-American learners observed in classroom settings (Phillips 1986). Observations outside of the classroom indicated that learners were not silent. In the learners' homes, children were working together cooperatively in groups, not competitively, while classrooms were organized in an individualistic and competitive manner. Thus, for a Native-American learner to stand out in the classroom, to act on his or her own, independent of the group, was a violation of the norms cultivated in their home.

It is part of the work as educators to see and welcome students' unique funds of knowledge and incorporate their perspectives into science learning. If not, we risk

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[1] This paragraph is taken from the National Research Council. (2009). *Learning Science in Informal Environments: People, Places, and Pursuits.* Committee on Learning Science in Informal Environments. Philip Bell, Bruce Lewenstein, Andrew W. Shouse, and Michael A. Feder, editors. Board of Science Education, Center for Education, Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press. Pg. 213-214.

alienating younger generations whose insight, knowledge, and creativity will be vital to understanding and protecting our ocean and planet. To do this, we must think about the conditions that are created in science education institutions, how these conditions affect all learners, and how to teach science through a more inclusive lens.

Strategies for working with English language learners:
Below are a series of suggestions for helping all learners to engage with, feel included in, and make meaning of science activities and concepts:

- Create an emotionally safe learning environment including acceptance of errors, providing praise, and establishing routines and procedures.
- Connect to prior knowledge and experience—provide opportunities for brainstorms and quick writes.
- Use simpler, less complex language when speaking to a learner for whom English is a new language. Refrain from using idiomatic expressions or "buzz" words. (Note: It is important for the learner to sometimes have the opportunity to hear the full complexity and richness of the language.)
- Do not assume that the learner understands everything you say. Contextualize language and ideas with pictures, gestures, objects, manipulatives, and movements that will help to convey your meaning.
- Encourage learners to discuss and clarify ideas with their peers, and answer your questions in the language with which they feel most comfortable, or choose a spokesperson to answer for the group.
- Do not force eye contact; prolonged eye contact between a learner and an educator may be interpreted as disrespectful in some cultures.
- Slow down your language a bit when you speak.
- Do not raise your volume when speaking. Loudness does not compensate for lack of understanding, and may be interpreted as anger.
- Accept a learner's initial silence as a natural stage of development and don't force them to speak, especially in front of others.
- Do not correct the learner's errors when she or he attempts to speak English. Instead, model the correct form in your response.
  For example: If the student says: "I like that car, she is so fast!"
  You may respond: "Yes, it is fast."
- When asking questions, incorporate the answer into the question, or give the learner choices so as to give them a base to work from.
  Instead of asking: "Which fish is more difficult to see in the tank?" ask: "Is the striped fish or the white fish more difficult to see in the tank?" The learner can then use your language in his/her response.
- Allow plenty of time for the learner to answer a question, or wait a bit and then re-phrase the question in simpler language. Don't jump in too quickly with the answer. Remember, when answering a question, the learner first must be sure to understand the English words, next figure out a response, and then remember the English words to use in the response. The learner needs time for considering and responding to your questions.
- Use cognates (*words that are spelled the same in both languages, but may sound different*) whenever possible.
- Check for understanding such as thumbs-up/thumbs-down and think pair share.

Adapted from various sources including *Bank Street College's Guide to Literacy for Volunteers and Tutors*

Inclusive Instructional Techniques for
Learners with Disabilities

General tips:

- **Be prepared to include learners with disabilities in your activity.** While you can't possibly prepare to meet every need, a little thought and planning will go a long way toward insuring that learners with disabilities have a good experience.
- **Make learners with disabilities aware of the resources that you have available for their use** (e.g. "I have a clipboard if you prefer to use it," "I can adjust the height of that microscope for you"). Then step back and follow the learner's lead. Respect the learner's autonomy.
- **Learners with disabilities are not always easily identifiable using physical cues.** Be prepared to adapt your activity for any learner who needs help. Many of the suggestions below help make activities accessible to all learners, not just learners with disabilities.

For learners who are deaf or hard of hearing:

The most common adaptations relate to communication. These suggestions are designed to facilitate two-way communication.

- **Collaborate with a sign language interpreter (if one is available).** Environmental concepts are not necessarily common signs in sign language so the interpreter may need some background information and explanation to interpret effectively.
- **Face learners who are deaf or hard of hearing when speaking to accommodate lip readers.** Do not exaggerate your mouth movements. Invite learners who are deaf or hard of hearing to position themselves in the front and middle of the group so they can see you more easily. Maintain good eye contact.
- **Provide directions in writing with illustrations and pictures as appropriate.** Be prepared with a written explanation of the activity and an outline of the steps in the activity and/or the activity components, whatever is needed so that a learner reading the material can participate in the activity without needing verbal directions.

For learners who have difficulty with fine motor tasks:

- **Evaluate the materials** used in your activity and the tasks learners may do while participating in your activity**.** Think about using and making materials easy to grasp and manipulate.
- **Limit the amount of writing and drawing required in your activity and be sure to have alternate activity components** for learners who have difficulty writing and drawing.
- **Provide outline drawings that learners can color instead of having to draw.** Make the drawings simple with bold outlines. Don't make

drawings too big or too small. For example, an outline of a turtle that occupies about one half of an 8.5 x 11 sheet of paper is a good size.

- **Provide large crayons and markers** as well as standard size crayons and markers. Provide short pencils (3"– 4" long) with pencil grips (which both help visitors grip pencils and help keep pencils from rolling away).
- **Limit the amount of cutting** that is required in your activity. Use pre-cut components and 3-D materials (e.g. clay, craft foam, etc.) for any art projects or "take-away" projects.
- **Use glue sticks** instead of bottles of glue.
- **Limit tasks that require extensive use of a pincer grasp.** In other words, limit tasks that require learners to pick up small objects with thumb and forefinger.
- **If a learner is having difficulty with a task, ask if you may help**, but do not take materials away from the learner to complete the task for them.

For learners who use wheelchairs:

- **Use a table or display area for your activity that has knee space** and allows a learner using a wheelchair to pull up close to see and reach materials. Invite learners who use wheelchairs to position themselves in the front of the group.
- **Be prepared to adjust the height** of microscopes and work surfaces or arrange your activity on a surface that is at a height that is easily accessible to someone sitting down.
- **Have trays and clipboards handy** so that learners who use wheelchairs can work with materials in their laps if they choose.

For learners who are blind or have low vision:

- **Think about using tactile materials and hands-on activities.**
- **Give clear verbal directions.** Provide vivid description and narration of the activity as it progresses.
- **Design your activity with a variety of items for learners to touch.** Name or describe items before encouraging a visitor to touch them. Use yarn, 3-D paint, fabric or other tactile materials to create raised lines and areas on maps and diagrams. Keep maps and diagrams relatively small or break them down into a series of parts.
- **Provide opportunity to make crafts and "take-away" items out of 3-D materials** (e.g. clay, craft sticks, craft foam) instead of making a drawing.
- **Have written materials available in alternate formats if possible** (e.g. large print, Braille, audio cassette). Keep worksheets uncluttered. Use at least 18-point solid black block font on white paper. Enlarge photographs.
- **Have a variety of magnifiers** available for learners with low vision.
- **Have thick black markers** available for learners with low vision.
- **Use materials that provide color contrast for learners with low vision**. For example, cover a light tabletop with paper or a plastic tablecloth that provides contrast with white paper so that learners can see the edges of

the paper on which they will draw.

For learners who have developmental disabilities:

Developmental disabilities include cognitive disabilities and autism.

- **Give clear verbal directions.** Explain the activity one step at a time, allowing the learner to complete a step before moving on to the next one. Use common words and simple phrasing (e.g., "snail," instead of "gastropod," "back," instead of "dorsal," "food," instead of "prey") but do not talk down to the visitor. Use a calm, conversational voice—too much excitement can be distracting and overwhelming. Repeat instructions to provide on-going verbal cues and/or restate instructions and information in several ways.
- **Use step-by-step demonstrations.** Demonstrate a part of the activity, showing the learner what you want them to do, and then give them time to do the task. Use verbal prompts as needed and warranted, but resist the temptation to do the task for the learner. If a learner has repeated difficulty with a task, ask if you may help, but do not take materials away to complete the task for them.
- **Emphasize "what" questions (e.g. "What do you see?") and limit your use of "why" and "how" questions.** Many people with developmental disabilities have difficulties with language processing, and it is easier for them to find the words to respond to factual (focused) questions.
- **Asking "yes and no" questions and questions that require one word answers also helps people who have difficulties finding the words to respond.**
- **Some learners may prefer to interact with and explore the materials in their own ways.** Give them as much freedom as you can to explore as they want and need. Be aware that some learners may have sensory preferences and be reluctant to touch materials with certain textures.
- **Use written materials that are simple and concise.** Avoid the tendency to make written materials that are information-dense. You can convey the same amount of information by dividing it up among a number of pages or cards. Use relatively large font (14- or 16-point), high contrast (black type on white paper), and double-spacing between lines to help with tracking while reading.
- **Use pictures in addition to written material.**
- **Provide opportunities for learners to draw instead of write.** Many people with developmental disabilities also have difficulty with fine motor tasks and will benefit from the adaptations listed in fine motor tasks section above.
- **Provide opportunity to make crafts and "take-away" items out of 3-D materials** (instead of making a drawing).

Adapted from: National Wildlife Federation "Happenin' Habitats" program.
http://happeninhabitats.pwnet.org/inclusive_techniques/index.php

Core Values

Individualism	Harmony	Knowledge	Respect
Relationships	Group decisions	Resourcefulness	Primary control
Spontaneity	Personal growth	Freedom of expression	Pride

Characteristics — positive and negative perceptions

Positive Perception	Negative Perception
Team Work	Giving up individuality
Rational & efficient	Cold & calculating
Respect for authority & Hierarchy	Not questioning
Oral tradition	Less literate
Indirect communication	Not expressive
Pride	Chip on shoulder
Holistic thinking & affective	Less rational & Emotional
Frugal	Tightwad
Creative problem-solving	Rebellious
Saving Face	Non-assertive
Thoughtful	Slow to respond
Loyalty	Submissive
Group decision-making & Consensus	Not speaking up
Improvisational & Creative self-expression	Flashy & Undisciplined
Think before react	Not expressive
Take charge & responsibility	Pushy
Communal cooperative activities	Grouping together
Strong-willed	Abrasive
Passionate & Expressive	Reactionary & Explosive
Keeps things light with humor	Unfocused

Klingon Values Chart
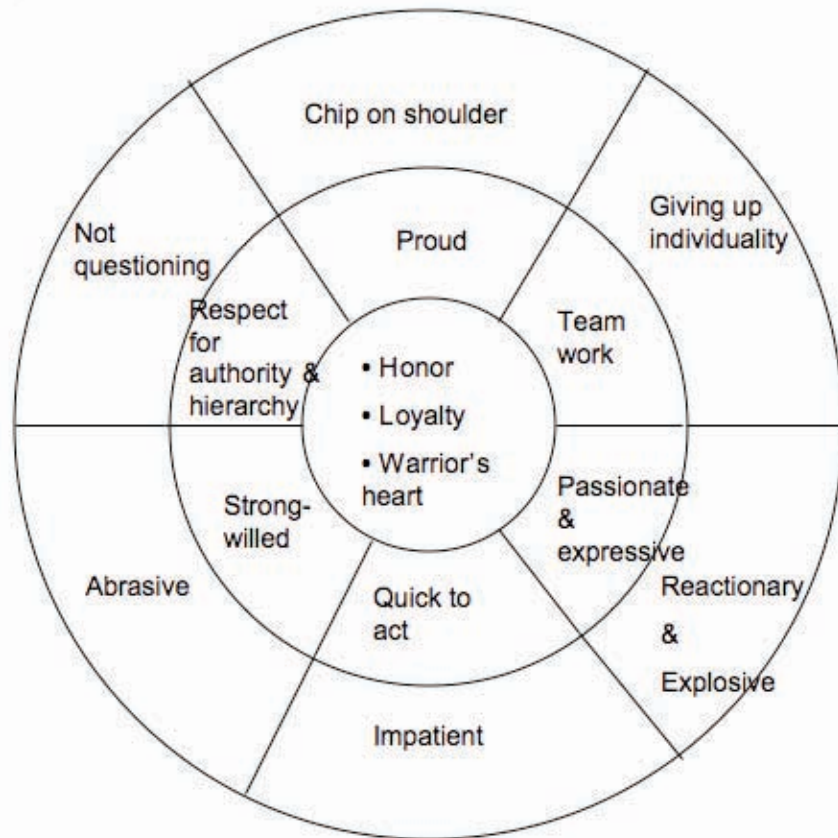
MANZANA Y OCEANO
(Spanish Outline for Apple and Ocean Presentation for Facilitator)

1. El Globo—"Hoy vamos a estudiar sobre el planeta tierra"
2. 3 preguntas: ¿Que fracción del planeta es tierra, agua y agua potable? Usar tarjetas de fracciones
3. Un Modelo: la manzana y el plato
4. Las reglas: yo corto - uds cortan - yo dibujo - uds dibujan

La Tierra:
- 4 pedazos: ½ y ½ = ¼
- que fraccion? Un quarto
- corten
- que representa? ¼ es tierra y ¾ son agua
- dibujar en el plato
- PPt

— Un cuarto en 2= 1/8
— Que fraccion? Un octavo
— Corten
— Que representa? Tierra Inhabitable
— Plato—dibujar persona no
— PPt

- No cortar—otro 1/8
- Que fraccion? Un octavo
- Que representa? Tierra Habitable
- Plato—dibujar persona si
- PPt

— Cortar 1/8 en 2 = 1/16
— Cortar 1/16 en 2 = 1/32
— Que fraccion? Un treintaydosavo
— Corten
— Que representa? Tierra Cultivable (arable)
— Plato con color verde
— PPt

- Cortar pedazo pequeño
- Que fraccion? ?? 3/10.000
- Corten
- Que representa? Agua Potable
- Plato – dibujar 8 puntos en toda la tierra
- PPt

Cambien de trabajo

El Oceano
 — Cortar un quarto en 2 = 1/8
 — Cortar un octavo en 2 = 1/16
 — Que fraccion? Un dieciseisavo
 — Corten
 — Que representa? Las Zonas Costeras Productivas (90% de la pesca)
 — Plato — dibujar un pez
 — PPt

 • Cortar pedazo pequeño
 • Que fraccion? ?? 3/4.000
 • Que representa: Zonas de Ascensión Hidráulicas (6 zonas en el Oeste)