Ambitious Science Teaching
Final Project

Environmental Art Session

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PROPOSAL

For this paper, I will be informed by research and what I have learned over my Masters in Education program and my experiences as an Environmental Educator to develop best practices for Environmental Art lessons and programs. My aim is to create this programming for many Environmental Education places and spaces, such as Seattle Parks and Recreation, the Washington Park Arboretum, and at IslandWood. To help narrow my focus within this project, I will be creating an Environmental Art session as a hypothetical Artist in Residence at IslandWood. The Artist in Residence program invites different artists from around the Salish Sea area to join IslandWood's Student Overnight Program (SOP) for a designated week. The artist works with specific groups that are visiting IslandWood for the week and has an hour and a half to a two hour block of time with a field group of 12 grade-age students- usually in 4th or 5th grade, who are lead by IslandWood Instructors.

ENVIRONMENTAL ART SESSION CURRICULUM

Foundations of Lesson Planning and Curriculum

When doing any curriculum planning and building, educators need to know some key factors to begin with: what, who, where/when, and how long (Tyler, 2013). I have already established in this paper so far that my "what" is the topic of Environmental Art. Since I am placing myself as an Artist in Residence while running the Environmental Art program, "who" I will be working with include the 4th and 5th graders, instructors, parents/caretakers, and any teachers and staff that might be present in a group during the SOP week. As a former IslandWood Instructor, I have some ideas about "where" I'd

theoretically like to run my programs. I'd like to have access to an indoor space for the purposes of establishing and building a community with the groups I am working with, and to come back to at the end of our time to do some wrap up and discussion around what we did as we made our environmental art. Since we are doing art that uses natural materials, I will also need access to a designated area to collect and potentially build the artworks the group will come up with. The "when" is somewhat up to the SOP coordinators to figure out how my session will fit in to the week's schedule, and I will give them a two hour timeframe to best fit what I have planned into the day.

Below, I outline a curriculum for an Environmental Art session that I can run as the Artist in Residence and then analyze why certain curricular elements are included in this session. Before I go into this piece, I will discuss the importance of adapting and modifying curriculum to align with group needs and instructors' ideas. Before I meet with the groups, I will first check in with the instructors who are working with the groups throughout the week. During that check in, my first task is to build a relationship with the instructor and get to know both them and any important insights they might have about the school and the group to factor any sociocultural or socioemotional components into our time together. In learning more about the instructor and the group, I would be informed about how to further plan how the time of my Environmental Art session to benefit the group and any other potential plans the Instructor might have for their week with the students.

As an educator I believe strongly in the importance of building a community with the people you are educating. IslandWood instructors use some type of community agreements with their groups in order to build norms of behavior, participation, and

academics that may be expected from the students' backgrounds and apply those to the living and learning community at IslandWood ("Community Agreement - IslandWood Education Wiki", 2019). Before my session, I will again check in with the instructor and see if we can help set up the group for success. My idea for a way to set up the group for success is to have the group discuss that they will be doing the Environmental Art session, and that they will be engaging in art and discussion that will involve collaboration and communication. I will suggest to the IslandWood instructor that they work with their group to select some community goals they think are appropriate to have when collaborating and communicating with each other and when they are being creative. When the students do arrive in the designated space, I will start by briefly introducing myself and that we will be doing Environmental Art.

After this short introduction, I will be doing an activity which solicits names, pronouns, and a sharing of any type of art that the students, instructors, and parent/teacher chaperones in the group may enjoy. Then, I will start to discuss with the students how to build a collaborative learning and experiential community in the time we have by asking them about any norms we may need when we are working together, creating art, and discussing our processes and ideas. Finally, we will move into the Environmental Art session itself. I will further describe below setting up a curriculum for this proposed Environmental Art session as the Artist in Residence at IslandWood and evaluate why I have structured the lesson as to align with certain educational goals and teaching practices.

CURRICULAR FOUNDATIONS

Creating a community of shared space where we can learn collaboratively is a

key factor in building my lesson curriculum. In terms of setting up curriculum, the educator must know the audience they are working with, and any objectives they want to have within the curriculum they are making. From personal teaching experience and from many educational researchers and scholars I have learned and re-learned the importance of setting up a learning environment that sets the group up for success and values each individual's academic, sociocultural, and socioemotional backgrounds and knowledge as an educator. The importance of honoring and supporting the growth of learning and development through disciplinary knowledge and valuing the intersectional identities that a person may hold are found in educational ideologies of child-centered learning, culturally relevant pedagogies, and social-emotional pedagogies (Nieto 2013).

I will use these pedagogies to establish and build a caring environment (Tyler 2013,p.64) as the group and I work together in creating a "brave space" of community norms around participation when in discussion and argumentation about the data, questions, and ideas students may have. I am specifically using 'Norms to Establish an Atmosphere of Civility and Safety' described within Windschitl, Thompson, & Braaten's *Ambitious Science Teaching* textbook. These authors describe that "productive conversations require students to take risks in public- to hypothesize about… ideas they are only partly familiar with, to comment on the contributions of classmates, or to ask questions that may reveal a lack of understanding. Because of this, the most basic prerequisite for productive conversations is that all students *feel safe* in speaking out" (Windschitl, Thompson & Braaten 2018, p.66). I will further explore the community norms that I plan to use within the Environmental Art session and the methods I will use to support these norms in the next sections.

Community Norms

I hope to establish the norms of the Environmental Art session with the groups I am working with based on their own needs and any community contract that may already be in place. In order to build a brave space where participants are collaborative and creative, there needs to be an element of co-creation of what these community of norms will be with the group you are working with. There are at least three categories of norms that are needed to build a brave space where learning, socioemotional, and sociocultural perspectives interact through: "respect for others, equitable participation, and accountability to the [learning] as well as one's classmates" (Windschitl, Thompson & Braaten 2018, p.66) being valued. In saying this though, I will explicitly state that there are certain norms that I expect myself and the participants of the session to follow and to hold ourselves accountable to for the time together. These are norms, informed by Table 4.1 from Ambitious Science Teaching (found in Appendix I of this paper). I will share norms in more explicit language on top and then kid-friendly language underneath. These norms include:

- Knowledge can and will shared in many ways through engaging with visual, verbal, non-verbal, and oral communication that values multiple languages and cultural backgrounds and identities.
    - **KID FRIENDLY**: *Communication through many forms, honoring cultures*
- Communication will be used as a way to build understanding of topic and to deepen each other's ideas and questions as well as our thinking and creation processes.
    - **KID FRIENDLY:** "*Yes and": build on others' ideas*
- We will speak from our perspectives, knowledge, and understanding and give new perspectives which add to others' learning and will request clarification, show agreement or confusion, verify, and ask others to repeat as needed.
    - **KID FRIENDLY**: *Speak from your heart, listen to understand, and ask for expansion/repetition*

- We will give “wait time” for all to have a chance to think and process before speaking and when we are soliciting ideas, give others a chance to speak by watching our “air time”, and when others speak we will listen actively without interruption.
    - **KID FRIENDLY**: *Give “wait time” to process; watch our “air time” when we share*

All of these norms draw on and expand the three main ideas found within community norms of accountability, equity, and respect for each other. These are themes of education that I value greatly in my own teaching practices in order to build learners and leaders with more collaborative, critical, and creative mindsets. In addition to the building of norms, the sharing of names, pronouns, and what types of art we enjoy as a group is important to do in this space as a practice of getting to know one another in creating a community (Sausa, 2005). The sharing of pronouns is especially important to me to norm saying pronouns outloud, as a person who identifies as Genderfluid and uses they/them/their pronouns. Once we establish and build these community norms, we also need to have some tools to help students use the norms.

Supporting Community Norms

In order to develop the participants’ knowledge in the Environmental Art session, we are going to need to know how to navigate our understandings of academic, social, cultural, and societal content. One way that I will support the students’ ability to think through these dimensions of learning happening within the Environmental Art session is introducing “talk moves” by providing sentence/question stems for argumentation and discourse. The concept of talk moves is informed by Ambitious Science Teaching, and specifically the taxonomy chart from Figure 3.2 (found in Appendix I of this paper). There are many talk moves I feel are important to use for teaching any content or concept. For

the scope of the Environmental Art session, I will be supporting explicit knowledge of one explicit talk move and one implicit move.

One of the talk moves I will be having the group implicitly practice is called wait time. This idea was mentioned above in the Community Norms section above, and means that there is a certain amount of time expected in between when the someone, often the instructor, asks a question and there is a response and/or answer to that question. Wait time is important as it gives participants time to think and process, as well as to help the answers and responses that follow become more thoughtful (Windschitl, Thompson & Braaten 2018). Another talk move we will explicitly practice during the session is called probing, which I will explain further below.

Probing refers to the act of making observations and/or ideas public and can be used with relevant out-of-school experiences that the participants may have had before. When the probing is used, it is necessary that no one is evaluating or judging the ideas, observations, or understandings that are coming up (Windschitl, Thompson & Braaten 2018 p. 54, 63, 80). There are many ways to ask a probing question that will help facilitate learning. As inspired by Figure 4.3 of *Ambitious Science Teaching* (found in Appendix I of this paper), the probing questions I will have visible and will go over during the session include:

- What made you think that…
- Why did you think…
- How did you…
- What could we learn from…
- Do you think it's important that…

These sentence/question starters are helpful for scaffolding the participants' ability to engage in conversations that will elicit ideas and also push the ideas that are shared into

deepening and expanding the information, ideas, and understandings that are coming up. As the facilitator of the session, I will also add some prompts to further add to the probing, such as:

- I agree with you, and I also think…
- I agree with you, and couldn't you add…
- I agree with you because…
- I know where you're coming from, but I have a different idea…
- I disagree with that idea because…
- I think you're headed in the right direction, but…
- What do you mean by…
- What makes you think that…
- Could you be more specific…

Much like the probing questions above, these additions will help students become familiar with whole-group discussions and argumentations, where the group will be in an environment where critiquing, adding onto, and engaging with other ideas, questions, and understandings is expected and normed (Windschitl, Thompson & Braaten 2018, p.79-80). These talk moves will be used throughout the session and in different sections of the curriculum presented. The curriculum that I will be establishing within the Environmental Art session features best practices for education such as the use of objectives, concepts, and methodologies. Throughout the next sections, I will explain the curricular foundations of the Environmental Art session.

ENVIRONMENTAL ART CURRICULUM

Curriculum Objectives

One key component to a curriculum is the objectives that the educator has for the participants they are working with. The objectives I have for the Environmental Art curriculum are as follows:

- Students can correlate the meanings of shape, structure, color, and texture as it relates plants

- Students will be able to use natural materials to engineer their materials in order to create a piece of artwork representing artist intention
- Students can use communication to explore their relationships to creative artmaking process(s), both individually and with other peers
- Students can engage in collaborative critical thinking in order to build understanding of place through sociocultural and socioemotional supports in order to foster their ability to reform society

These objectives are in place to base the curriculum in academic rationalism, which incorporates learning through different academic disciplines (Deng, 2015). During this Environmental Art session, the students will be interpreting data relating to art and science content. They will be applying literacy and science knowledge from both Common Core and Next Generation Science Standards (NGSS) into practice as they think about, question, and interpret art and the art-making process and think about the human and natural world. In doing Environmental Art they will be thinking about how humans use the environment, and how humans and more-than-human interact and interconnect with each other and impact one another which cover science knowledge also used within NGSS at an age-appropriate level (Refer to Appendix I for more information). In engaging in critical thinking conversations about art, the artwork process, and assessing their work and the art of others, the students are using literacy practices in Common Core for their grade (Refer to Appendix I for more information). Within these objectives, I also want students to delve into understanding their societal behavior (Tyler 2013,p. 58,60,61) by thinking about their impact on each other in this space, in their community, and their society when thinking about how energy interacts in the environment and how humans and the environment affect growth.

In developing both academic and societal knowledge, I will be asking the students to think about materials to use that are available in whatever outdoor space

we're using. One way that I will support the students' ability to think through the academic and social learning happening within the Environmental Art session is through the talk moves described earlier. One area I will be asking participate in talk moves and critical thinking pedagogy is through thinking about their art projects. I want them to think through how many resources they are taking and using, and what impact that may have on the environment. I will apply talk moves, art literacy, and critical thinking for their collection and designing processes and help them through what they may make, why they want to make it, and how they will use the materials to build and add to what they are creating (Burbules & Berk, 1999; Windschitl, Thompson & Braaten 2018).

One specific art literacy practice that I would like to use within my proposed Environmental Art session is the Critical Response Process (CRP). Leading a structured CRP session is a way for students to initiate meaningful conversations through critique to both enhance their skills as an artist and build their understanding of art literacy as a tool for deepening social and academic practices. During CRP, students offer affirmations, impressions and connections of a peer's art project completed during the residency. The artist then continues CRP by asking a question to the group based on artistic intent that will help them reflect on their creative and aesthetic choices. The students then ask questions to their peer artist and finally make suggestions for the artist to consider when reworking this piece or conceiving another artwork. By analyzing their own work as artists and questioning the techniques and meanings behind them, the students are building many different literacies at once (Silverman & Xiaoming, 2015).

Curriculum Concepts

The first step in developing understanding in a curriculum is introducing different concepts. Although I have already established that we are doing environmental art in our time together, I would be explicit in our need to define what is meant by the concept of "Environmental Art". As the facilitator, I will first introduce the topic by soliciting prior knowledge and experience from the students by seeing if the term Environmental Art was familiar to anyone or if we could figure out what it meant just from the words themselves. Everyone in the Environmental Art session must further examine the concept of both "Environment" and "Art" to be explicitly clear as to what we are meaning when we use them individually and together (Larson & Keiper, 2011). Although I will be asking the students to think to these terms first on their own, share them with a partner, and then to the larger group, I will explore what possible meanings the participants could be thinking about the concepts "*Environment*" and "*Art*":

Environment:

- A "place" in general. "Environment" could be expanded to include definitions about environment on space; on different planets
- The different beings in a place/space including animals, plants, people, and "non-living" elements (rocks/water/air & etc)
- The beings and their interactions: how do animals/plants/people, "non-living" elements work together, interact, and use energy in different ways

Art:

- Visual Arts: dancing, performance, clay/ceramic art, glass, drawing/painting, sculpting, mixed media/medium(s), collaging, "nature art" (building and maneuvering natural materials)
- Verbal Arts: performance, theater, poetry, storytelling, music, mixed media/medium(s)
- Non-Verbal Arts: writing, music, performance, and other "visual arts"
- Communication and learning as an "art""; creative communication as an act of human connection/re-connection and expression (concept of 're-humanization')

After exploring these concepts, I would move on to rolling out the Environmental Art activities to further our learning and move what we have been thinking about into practice.

ENVIRONMENTAL ART ACTIVITIES

Initial Activity using Environmental Art Examples

The first activity after introducing what we're doing and soliciting initial ideas, questions, and understandings is to give some picture examples of Environmental Art to further our ideas. Examples of different types of Environmental Art are found in Appendix Part II. I will ask small groups to observe the image and do some thinking about how this art is made, and perhaps factor in thinking about the artists' intention into why this was made. I will solicit these ideas and initial thoughts by utilizing the talk move of probing questions by asking:

- What do you notice about this art project?
- What shapes, colors, textures do you observe?
- What materials were used?
- What are the small parts, and what do they represent?

It is here that I will seek to understand the prior knowledge of art components and the scientific engineering that the group may have. I will also factor in talk moves seen on the Talk Moves Taxonomy chart from Figure 3.2 (found in Appendix I of this paper) by asking:

- **Follow-Ups**: "What do you mean by that", "Say more about…", "How is your idea different from..."
- **Opening Up Cross-Talk**: "Does anyone want to respond to…", "What do others think about…", "Who agrees or disagrees with this"
- **Revoicing**: "So what I hear you saying is… please correct me if this assumption is wrong", "Here's how I'm understanding your idea… please correct me is this assumption is wrong"

These talk move examples will help to continue to activate prior knowledge, help the group make sense of what they might be seeing and/or doing, and connect the activity with the larger session (Windschitl, Thompson & Braaten 2018).

With same small group, I will then have students work together and brainstorm about materials to use with these following prompts that follow the talk move of probing (Windschitl, Thompson & Braaten 2018, p.79-80):

- What is available in place/space?
- What materials might you use?
- Are you wondering anything about a particular design from these examples?

Depending what arises in the conversation, I may choose to employ further talk moves and/or have the participants work on their ability to do talk moves based on the examples of probing and follow-up questions found on Figure 4.3 of *Ambitious Science Teaching* (found in Appendix I of this paper). I will also add some prompts to further add to the probing, such as:

- What do you mean by…
- What makes you think that…
- Could you be more specific…

When doing this, I will be explicit that I am trying to help push learning and also deepen our understandings. If I feel like I am pushing too hard on one particular student, I may open up the idea, question, or understanding to others by Opening Up Cross-Talk and asking something like: “What do others think about that?”. In transitioning to the outdoors, I will invite others to think about the probing questions to themselves and with a partner: “What design might you make?” and “Why are you interested in that?” as we are transitioning from our indoor space towards where we will be going to do our Environmental Art making activity.

Environmental Art Making Activity

There are many ways to do Environmental Art, as evident from the examples provided in Appendix Part II. The examples in this paper are pieces that I personally have made over many years, in many spaces, and with different intentions. It is this prior experience and the passion for making art from nature and inspired by my relationship to intersections of the human and more-than-human world that I feel more than able to support other people in their natural artmaking journeys. No matter the individual's path to the nature art that they decide to do, there are simple steps that any educator who wishes to do Environmental Art can follow.

I personally like to incorporate any helpful visual or written elements when I do this. As you set out expectations and guidelines, you can write instructions down with tools like a whiteboard and marker. The first step is to tell the participants that they will be gathering items found in nature. Before you release them to do this, there are some considerations that they need to know to keep themselves, their peers, and the environment safe. You need to establish any boundaries that the participants will be moving and collecting in, and check that all understand those boundaries. If it helps, have yourself or participants physically move something to these boundaries such as a cone or bright accessory like a scarf or backpack. Then, make sure participants know to collect mostly from the fallen plants on the ground and sparingly from nature that may still be growing.

After gathering materials, call the group back together for next steps. Explain that in a moment, the participants will need to find their "canvas" or a space on the ground in

a designated area, again pointing out the boundaries. When the participants find their canvas, they will have a designated amount of time to move their materials around and create a design. I like to give the participants in an Environmental Art session at least 20-30 minutes to create their works. As participants are in the stages of creation, ask them to share their process with you, and with each other. During the creation process, you can also use the talk moves as described throughout this paper to have the students think about their work, the intent they have behind making their art, and what else they may need to do to have their creation be "complete". Our last activity will be a Gallery Walk to visit the works that the participants have made during our creation process. After you visit the art created, have the group come together and work through questions to help them process what just happened. I will suggest the following probing questions:

- What happened? What did you make? How and why did you make this?
- What did you learn through this experience?
- Do you have any new thoughts or questions about the materials we used?

Since they've done a lot of group sharing so far, you might choose to have the group answer some, or all, of these questions silently in a journal or other personal writing book.

Next in the Environmental Art session, have the students transition to do Critical Response Process (CRP). Have the participants go through Gallery Walk with the following steps:

- Students offer affirmations, impressions and connections of a peer's art project completed
- The facilitator asks a question to the group based on artistic intent that will help them reflect on their creative and aesthetic choices
- The students ask questions to their peer artist about their piece
- The students make suggestions for the artist to consider whether reworking this piece or conceiving another artwork.

As the facilitator, you can choose to take out certain steps in the CRP so the students can then focus on obtaining certain skills rather than trying to do them all at the same time. Since I will be facilitating this within a short amount of time, I will have the participants practice steps one and three above to start to facilitate critical thinking around initial reactions and artwork making. On the way back inside to do a closing discussion, I propose asking a probing question which helps the students transfer their learning from what they did in this space to their own communities (Perkins & Salomon, 1992). As the facilitator, you could choose if you wanted the students to think about this individually, or find a partner to share with on the way back. An example of a transfer of learning probing questions are: “What kinds of materials can you use around your school/neighborhood to do this again? How could you represent something through environmental art that might be relevant to your school/neighborhood/community?”

Once inside, students will go through a series of discussion questions to help facilitate a further processing of their learning during the session. The discussion is also meant to help transfer their experience of doing Environmental Art to an understanding of how our relationships with the human and more-than-human world have impacts on how we act towards ourselves, our peers, our community, and to our environment. The discussion inside could include questions such as:

- How do I/others impact the environment during this process?
- Did my actions affect others by building with the materials? Through interacting with other group members?
- Why is knowing your impact on nature/others important?
- What can I/others do to help build knowledge of environmental issues? How can I “show” this to my community?
- What materials can I use for my project? What materials *should* I use? How much?

Through asking these questions, I hope to empower students to think creatively, critically, and collaboratively through thoughtful communication that will benefit them in their academic, socioemotional, and sociocultural lives. During this discussion, I will be asking evaluative questions (Kearsley, 1976) that can create actionable steps for the participants to apply the participants' learning and experience for themselves in their schooling and in their everyday lives.

In the practice of striving to create explicit steps to helping others to be successful in their learning and education, I have attached two Environmental Art lesson plans I have created and can be found on Appendix III of this paper. These lessons, titled "Flora Faunas" and "DIY Solo Walk", incorporates all of the curriculum planning and teaching practices outlined in the above sections into a format that could be printed out and utilized in any educational situation. "Flora Faunas" is specifically about the process of making Environmental Art based on Image 3 on page 28 and DIY Solo Walk is based on Image 2 on page 28. It is up to the educators who will read this paper to either use or adapt the current existing lesson plans or to draw inspiration from the lesson in creating something similar for their own educational places and spaces. With this paper and the attachments within the appendixes, I have created my own best practices for my educational and professional work and I hope that this will help others to feel like they can apply the knowledge and experience found within this paper for their own teaching and life practices.

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APPENDIX PART I

Supplemental Table(s) / Figure(s)

Table 4.1
as mentioned in Community Norms section of paper (on p.10) above

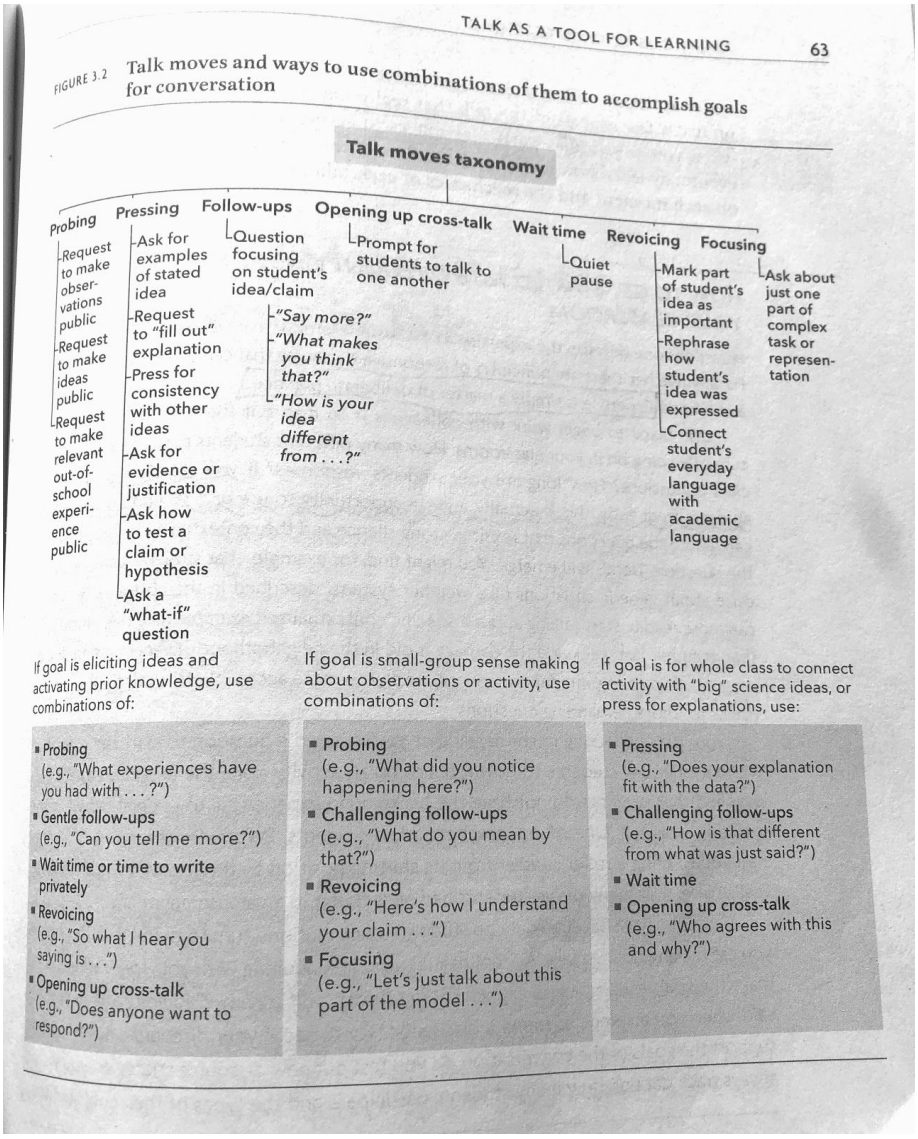
TABLE 4.1 **Possible classroom talk norms by category**

MENU OF EXAMPLES TO SELECT FROM	CATEGORIES
Preparation: We come prepared for discussion with notes, examples, stories, and our readings.	Accountability to science and classmates
Responsible learners: We are responsible for our own learning. This means we speak, request clarification, show agreement or confusion, verify, and ask others to repeat.	
Pushing ourselves: We push ourselves and each other to think beyond the obvious, disagree with ideas, and draw out comments from classmates, and we are open to changing our minds.	
Focus: Our comments and stories will stay on topic, and we have the right to explain how our contribution connects with the science.	
Hearing from all: Everyone deserves to be heard.	Equity
Air time: Don't monopolize the conversation, a.k.a. "Watch your air time."	
Priority to newcomers: We'll give priority to those who have not had chances to talk yet.	
Time to think: The teacher will give "think time" before asking for our ideas.	
Civil participation: No put-downs—ever.	Respect for each other
Impulse control: Don't interrupt or talk over your classmates when they have the floor.	
Fair critique: We, students and teacher, can critique ideas of others, but personal attacks are out of bounds.	

Table 4.1 from Ambitious Science Teaching (Windschitl, Thompson & Braaten 2018, p.67)

Figure 3.2

as mentioned in Supporting Community Norms section of paper above



TALK AS A TOOL FOR LEARNING 63

FIGURE 3.2 Talk moves and ways to use combinations of them to accomplish goals for conversation

Talk moves taxonomy

- **Probing**
  - Request to make observations public
  - Request to make ideas public
  - Request to make relevant out-of-school experience public
- **Pressing**
  - Ask for examples of stated idea
  - Request to "fill out" explanation
  - Press for consistency with other ideas
  - Ask for evidence or justification
  - Ask how to test a claim or hypothesis
  - Ask a "what-if" question
- **Follow-ups**
  - Question focusing on student's idea/claim
    - *"Say more?"*
    - *"What makes you think that?"*
    - *"How is your idea different from . . .?"*
- **Opening up cross-talk**
  - Prompt for students to talk to one another
- **Wait time**
  - Quiet pause
- **Revoicing**
  - Mark part of student's idea as important
  - Rephrase how student's idea was expressed
  - Connect student's everyday language with academic language
- **Focusing**
  - Ask about just one part of complex task or representation

If goal is eliciting ideas and activating prior knowledge, use combinations of:

- Probing (e.g., "What experiences have you had with . . . ?")
- Gentle follow-ups (e.g., "Can you tell me more?")
- Wait time or time to write privately
- Revoicing (e.g., "So what I hear you saying is . . .")
- Opening up cross-talk (e.g., "Does anyone want to respond?")

If goal is small-group sense making about observations or activity, use combinations of:

- Probing (e.g., "What did you notice happening here?")
- Challenging follow-ups (e.g., "What do you mean by that?")
- Revoicing (e.g., "Here's how I understand your claim . . .")
- Focusing (e.g., "Let's just talk about this part of the model . . .")

If goal is for whole class to connect activity with "big" science ideas, or press for explanations, use:

- Pressing (e.g., "Does your explanation fit with the data?")
- Challenging follow-ups (e.g., "How is that different from what was just said?")
- Wait time
- Opening up cross-talk (e.g., "Who agrees with this and why?")

Figure 3.2 from Ambitious Science Teaching (Windschitl, Thompson & Braaten 2018, p.63)

Figure 4.3
as mentioned in Supporting Community Norms section of paper above

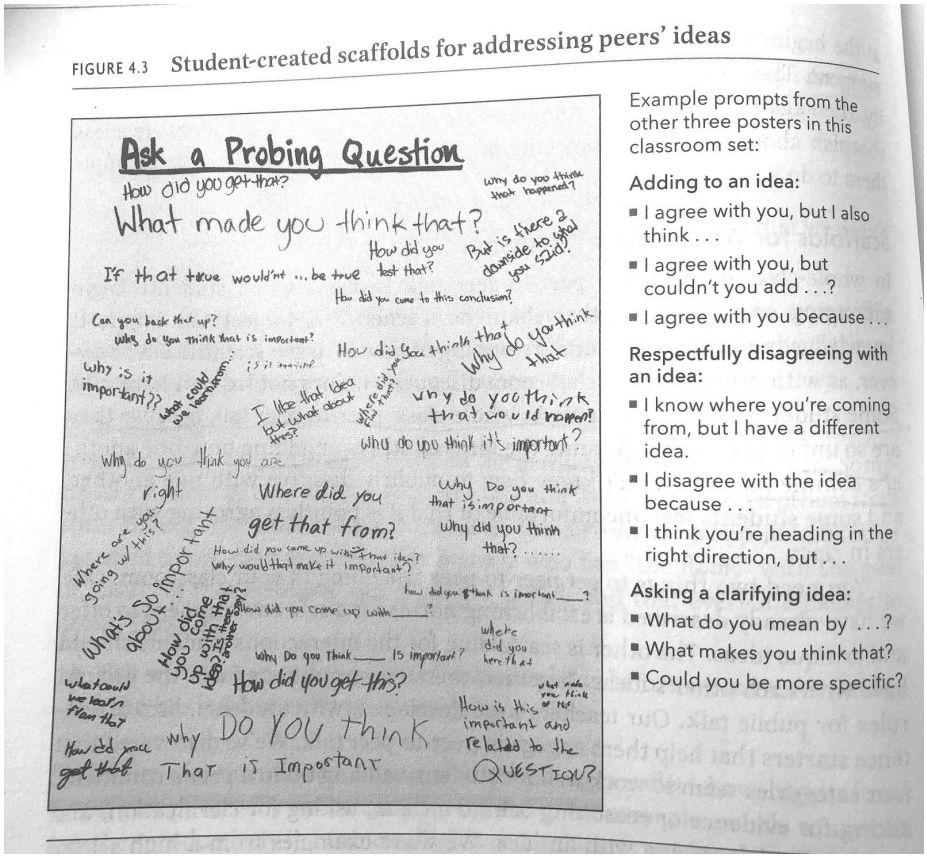


Figure 4.3 from Ambitious Science Teaching (Windschitl, Thompson & Braaten 2018, p.80)

NGSS Standards

as mentioned in Curriculum section of paper above

*For the Environmental Art session, we will be using NGSS standards **4-ETS1-1**, **4-ETS1-2**, and **4-ETS1-3***

3-5-ETS1 Engineering Design

3-5-ETS1 Engineering Design

Students who demonstrate understanding can:

3-5-ETS1-1. **Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.**

3-5-ETS1-2. **Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.**

3-5-ETS1-3. **Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.**

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Asking Questions and Defining Problems
Asking questions and defining problems in 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships.
- Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost. (3-5-ETS1-1)

Planning and Carrying Out Investigations
Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.
- Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (3-5-ETS1-3)

Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.
- Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem. (3-5-ETS1-2)

Disciplinary Core Ideas

ETS1.A: Defining and Delimiting Engineering Problems
- Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (3-5-ETS1-1)

ETS1.B: Developing Possible Solutions
- Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5-ETS1-2)
- At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3-5-ETS1-2)
- Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (3-5-ETS1-3)

ETS1.C: Optimizing the Design Solution
- Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (3-5-ETS1-3)

Crosscutting Concepts

Influence of Engineering, Technology, and Science on Society and the Natural World
- People's needs and wants change over time, as do their demands for new and improved technologies. (3-5-ETS1-1)
- Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands. (3-5-ETS1-2)

Connections to 3-5-ETS1.A: Defining and Delimiting Engineering Problems include:
Fourth Grade: 4-PS3-4
Connections to 3-5-ETS1.B: Designing Solutions to Engineering Problems include:
Fourth Grade: 4-ESS3-2
Connections to 3-5-ETS1.C: Optimizing the Design Solution include:
Fourth Grade: 4-PS4-3

(NGSS Lead States, 2013)

4-ETS1-1 → We will be specifically using the standards: ***Possible solutions to a problem are limited by available materials and resources (constraints)*** through creating Environmental Art with minimal natural resources.

4-ETS1-2 → We will be specifically using the standards*:* ***Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem*** through thinking critically about our Environmental Art designs based our engineering process as we design our art.

4-ETS1-3 → We will be specifically using the standards*:* ***Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved*** through thinking critically about our art and what could be changed/added to/modified depending on intent.

Common Core Standards

as mentioned in Curriculum section of paper above

For the Environmental Art session, we will be using Common Core standards ***CCSS.ELA-LITERACY.SL.4.1***

Comprehension and Collaboration:

CCSS.ELA-LITERACY.SL.4.1

Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 4 topics and texts*, building on others' ideas and expressing their own clearly.

CCSS.ELA-LITERACY.SL.4.1.A

Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.

CCSS.ELA-LITERACY.SL.4.1.B

Follow agreed-upon rules for discussions and carry out assigned roles.

CCSS.ELA-LITERACY.SL.4.1.C

Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others.

CCSS.ELA-LITERACY.SL.4.1.D

Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.

(Common Core Standards Initiative, 2010)

CCSS.ELA-LITERACY.SL.4.1→ *We will be using the standard* ***Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly*** through talk moves used throughout the Environmental Art session

Common Core Standards

as mentioned in Curriculum section of paper above

For the Environmental Art session, we will be using Common Core standards ***CCSS.ELA-LITERACY.SL.5.1***

Comprehension and Collaboration:

CCSS.ELA-LITERACY.SL.5.1

Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 5 topics and texts*, building on others' ideas and expressing their own clearly.

CCSS.ELA-LITERACY.SL.5.1.A

Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.

CCSS.ELA-LITERACY.SL.5.1.B

Follow agreed-upon rules for discussions and carry out assigned roles.

CCSS.ELA-LITERACY.SL.5.1.C

Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others.

CCSS.ELA-LITERACY.SL.5.1.D

Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.

(Common Core Standards Initiative, 2010)

CCSS.ELA-LITERACY.SL.5.1.C→ *We will be using the standard* ***Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others*** through talk moves used throughout the Environmental Art session

APPENDIX PART II

Supplemental Environmental Art Pictures

Image 1

IMAGE DESCRIPTION: A red flower sits in the middle of the picture. It is surrounded with a small circle made from a wooden stick that has tiny pink flowers on it. Outside of the circle is a pattern of flowers and petals, also made in a circle. The pattern of the exterior flowers and petals is: two long white flower petals then one pink flower. On the grass in the picture is some small pink/white petals. [1]

[1] I describe these pictures as an act of recognition that there may be participants in my program that do not have the same sensory privileges that I might. If the student(s) cannot access sight, I hope that these descriptions will be a way to help access the examples in a different way.

Image 2

IMAGE DESCRIPTION: In the middle foreground of the photo is a grey rock where the word “LOOK” and an arrow can be seen. Both “LOOK” and the arrow are made up out of pieces of natural materials which are reddish-brown and silvery brown. Below the rock is a piece of reddish brown piece of wood that is larger than the rock. In the background, there are a lot of small green plants and some grass. Some of these small green plants appear to be growing in between other pieces of wood in the right side of the picture.

Image 3

IMAGE DESCRIPTION: In front of a white background, there is a collage of natural materials in the shape of a squirrel.The squirrel is made up out of different kinds and colors of leaves. The head, ears, arms, and legs of the squirrel are a reddish brown leaf. The body below the reddish brown leaves is an orange leaf. The tail of the squirrel is made up of a grey-tan leaf. In the squirrel's hand there is a grey green leaf with many small lobes. The eye of the squirrel is a grey oval-like piece. The nose is a grey triangular shaped piece.

Image 4

IMAGE DESCRIPTION: On the rocky background of this picture sits a structure made from natural materials. The structure has a general oval shape, and is bound together with reddish tan ribbon-like pieces of wood. There is also sections of the oval that are wrapped around with black seaweed. Across the structure lay white and green stalks of a plant in a cross-cross like pattern. This plant across the middle has some stalks that have yellowish tufts at the top. In the upper lefthand corner of the picture is a person wearing a purple jacket working on the structure.

APPENDIX PART III

Supplemental Environmental Art Lesson(s)

Flora Faunas

Age Group:
4th Grade +

Materials:
- Collected natural materials
- Whiteboard with dry erase markers
- Butcher paper and markers
- Picture(s) of Environmental Art
    - Goldsworthy
    - Own artwork
    - Participant artwork from past
- OPTIONAL: Camera, cushions

Setup:
- ❑ Set up any indoor venue with enough seating for all participants in a circle shape
- ❑ Make sure there is enough space for whiteboard to be moved into and out of circle seating as needed.

Venue(s):
Introduction: Indoor Location
Material Collection: Any preferred Trails, Fields, etc where there is access to fallen leaves/branches
Project: Outdoors or Indoors

Time: 2 hours Total
Material Collection: 30 minutes
Project: 1 hour
Wrap-Up: 30 minutes

Lesson Summary:
This lesson explores shape, color, texture, and structure of the flora (plants) around us by looking closer and using the senses to make and fauna (animals). Through collecting natural materials found from safely harvesting botanical specimens, students learn more about the plants that are local to the ecosystems of IslandWood.

Objectives:
- Students will be able to correlate the meanings of shape, structure, color, and texture as it relates to both plants and animals
- Students will be able to use natural materials create a piece of artwork representing an animal found in the local ecosystem
- Students will be able to think creatively in order to engineer their materials to represent living creatures around the area
- Students will be able to identify parts and whole of the materials and of the final product.

Lesson Introduction:

Formative Assessment:
- Introduce the term “Environmental Art” and ask students to themselves if this concept is familiar and/or what we could figure out from the words themselves. Then, have the students do a pair/share to build ideas. Have students share out to the large group what they think so far about what environmental art might mean.
- Have small groups of 3-4 pair up and hand out some picture examples of Environmental Art. Ask small groups to observe the image and do some thinking about how this art is made.
- With same small group, have students work together and brainstorm about materials to use with these prompts:
    - What is available in place/space?
    - What design might you make? Why?

Next Steps:

Ask students if they have ever made art using plants before.
Say that students will be using natural materials to make art today, and will be invited to create local animal that lives around this area from these materials.
Ask what animals might live around this area. Have the large group go around and brainstorm those ideas, and put them on the whiteboard for all to see and add onto as you go.

Hook:
One animal that lives around here is the Douglas Squirrel! Here is a representation of that animal made from leaves found on the ground.

Show project example.

ABOVE: project example

Have students work individually and then with a partner to think about the following questions:

- What do you notice about this art project?
- What shapes, colors, textures do you observe?
- What materials were used?
- What are the small parts, and what do they represent?

Project Steps:

- Gather items found in nature. Limit the gathering of each person to 10 items or less. If the group is gathering from nature, please collect mostly from the friends already fallen on the ground and sparingly (and lovingly) from the friends who may still be growing.
- After gathering materials, get the group together for next steps. Tell students will need to find their “canvas” or a space on the ground in a designated area. The students’ next step is that they will get a chance to move their materials around, and create a design.
- As students are playing around with their creations, ask them to share their process with you, with each other.

- After setting up the creations, you can do a nice little Gallery Walk—admire those lovely works.

Debrief:
- What did you learn through this experience?
- Do you have any new thoughts or questions about the leaves or animals we used?
- *Transfer of learning* → "What kinds of materials can you use around your school/neighborhood to do this again? What animals could you make out of those materials to represent the ecosystem around your school/neighborhood?"

Summative Assessment:
- During the Gallery Walk, have students go through a version of Critical Response Process (CRP). Chose any, or all of the following for the CRP:
    - Students offer affirmations, impressions and connections of a peer's art project completed
    - The artist asks a question to the group based on artistic intent that will help her reflect on her creative and aesthetic choices
    - The students ask questions to their peer artist about their piece
    - The students made suggestions for the artist to consider whether reworking this piece or conceiving another artwork.

- Discussion Inside:
    - How do I/others impact the environment during this process?
    - Did my actions affect others by building with the materials? Through interacting with other group members?
    - Why is knowing your impact on nature/others important?
    - What can I/others do to help build knowledge of environmental issues?
        - How can I "show" this to my community?
            - What materials can I use for my project?
                - What materials *should* I use? How much?

Extensions:
You can do this project with glue and paper instead of on the ground for more permanence. I think stressing the impact of doing so for yourself and the group is important to think through and about with the paper option.

Related Lessons:
Goldsworthy Stewardship

Resources: A Collection with Nature Andy Goldsworthy

Created by Julie Hepp **on** 01/31/18 **; edited on** 02/28/19; **revised** 03/09/19

DIY Solo Walk

Age Group:
4th Grade +

Materials:
- Collected natural materials
- Whiteboard with dry erase markers
- Butcher paper and markers
- Picture(s) of Environmental Art
    - Goldsworthy
    - Own artwork
    - Participant artwork from past
- OPTIONAL: Camera, cushions

Setup:
- ❑ Set up any indoor venue with enough seating for all participants in a circle shape
- ❑ Make sure there is enough space for whiteboard to be moved into and out of circle seating as needed.

Venue(s):
Introduction: Indoor Location
Material Collection: Any preferred Trails, Fields, etc where there is access to fallen leaves/branches
Project: Outdoors or Indoors

Time: 2 hours Total
Material Collection: 30 minutes
Project: 1 hour
Wrap-Up: 30 minutes

Lesson Summary:
This lesson explores shape, color, texture, and structure of the flora to convey different written words or phrases that one might see on a Solo Walk

Objectives:

- Students will be able to correlate the meanings of shape, structure, color, and texture as it relates to both plants and written word
- Students will be able to use natural materials create a piece of artwork representing words and phrases
- Students will be able to think creatively in order to engineer their materials to represent the words or phrases they want to show to others
- Students will be able to identify parts and whole of the materials and of the final product.

Lesson Introduction

Formative Assessment:

- Ask the students if they have experienced a Solo Walk and recall their favorite card(s) and why
- Introduce the term “Environmental Art” and ask students to themselves if this concept is familiar and/or what we could figure out from the words themselves. Then, have the students do a pair/share to build ideas. Have students share out to the large group what they think so far about what environmental art might mean.
- Have small groups of 3-4 pair up and hand out some picture examples of Environmental Art. Ask small groups to observe the image and do some thinking about how this art is made.
- With the same small group, have students work together and brainstorm about materials to use with these prompts:
    - What is available in place/space?
    - What design might you make? Why?

Next Steps:

Ask students if they have ever made art using plants before.
Say that students will be using natural materials to make art today, and will be invited to create their own Solo Walk card out of what is found on the ground.
Ask them to recall the Solo Walk, what cards they liked, how the Solo Walk made them feel, etc.
Tell them to pick a word or small phrase to work with for their creating. Allow time to silently think, think/pair/share, and then large group brainstorm.

Hook:

Leave a “Solo Walk card” on the trail somewhere for the participants to find

Project example.

ABOVE: project example

Have students work individually and then with a partner to think about the following questions:

- What do you notice about this art project?
- What shapes, colors, textures do you observe?
- What are the small parts, and what do they represent?

Steps:

- Gather items found in nature. If the group is gathering from nature, please collect mostly from materials already fallen on the ground and sparingly from the beings who may still be growing.
- Ask them to think through what they want to “write”, where they will “write” it.
- As students are playing around with their creations, ask them to share their process with you, with each other.
- After setting up the creations where students choose (within boundaries), you can do a nice little Gallery/Solo Walk—admire those lovely works! So fun.

Debrief:

● What did you learn through this experience?
● Do you have any new thoughts or questions about the leaves or animals we used?
● Transfer of learning “What kinds of materials can you use around your school/neighborhood to
do this again? What animals could you make out of those materials to represent the ecosystem
around your school/neighborhood?”

Summative Assessment:

- During the Gallery Walk, have students go through a version of Critical Response Process (CRP). Chose any, or all of the following for the CRP:
    - Students offer affirmations, impressions and connections of a peer's art project completed
    - The artist asks a question to the group based on artistic intent that will help her reflect on her creative and aesthetic choices
    - The students ask questions to their peer artist about their piece
    - The students made suggestions for the artist to consider whether reworking this piece or conceiving another artwork.

- Discussion Inside:
    - How do I/others impact the environment during this process?
    - Did my actions affect others by building with the materials? Through interacting with other group members?
    - Why is knowing your impact on nature/others important?
    - What can I/others do to help build knowledge of environmental issues?
        - How can I "show" this to my community?
            - What materials can I use for my project?
                - What materials *should* I use? How much?

Related Lessons:
Goldsworthy Stewardship

Resources: A Collection with Nature Andy Goldsworthy

Created by Julie Hepp on 05/17/18; **edited:** 05/11/19